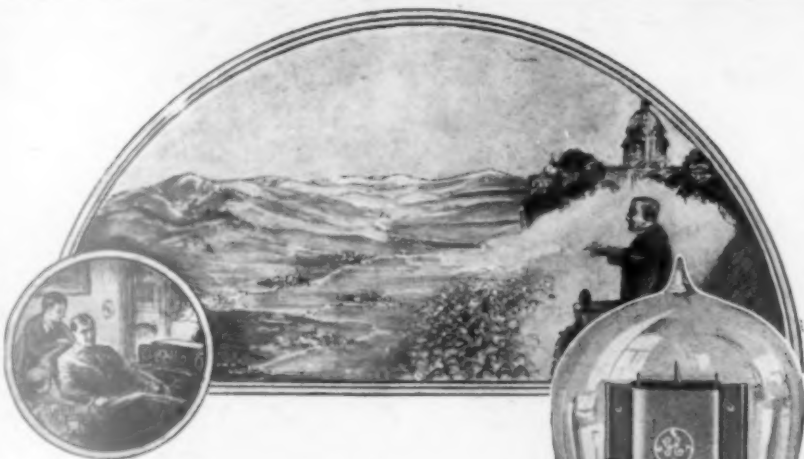


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The American
Radio Relay
League*

20¢

SECOND NATIONAL CONVENTION, CHICAGO, SEPT. 12-15.
DETAILS IN THIS ISSUE



Carries Great Messages Around the World

THAT statement adequately expresses what is perhaps the greatest influence of radio in developing and bettering human fraternal interest, not only between the people of one community, of one country, of one state, or even a single nation, but between all nations and all peoples of the world.

Be these messages from government leaders—from the heads of the world's greatest educational institutions or from those who stand foremost in the arts of the world—they will serve to bring the human race into closer contact.

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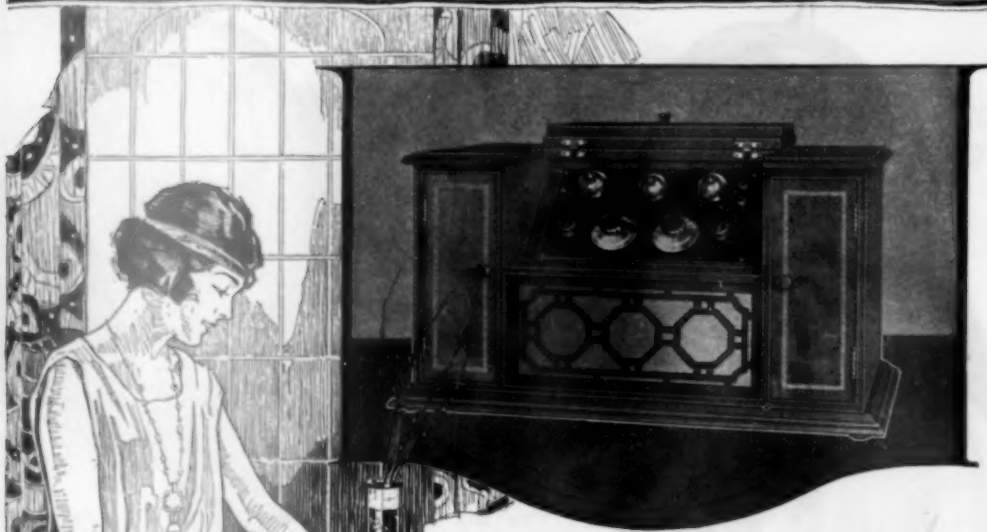
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The attractively finished walnut cabinet has compartments for all necessary batteries.

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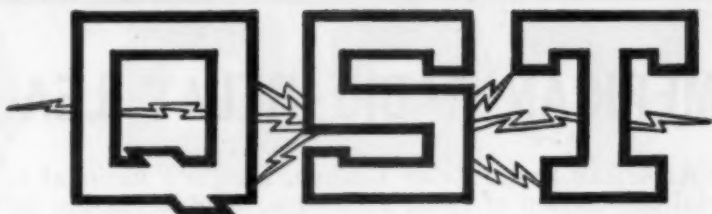


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Type CR-12



The Official Organ of the A.R.R.L.

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SEPTEMBER, 1923

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THE AMERICAN RADIO RELAY LEAGUE, Inc.
HARTFORD, CONN.

THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a national non-commercial association of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, for orderly operating, and for the practical improvement of short-wave two-way radio telegraphic communication.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a board of seventeen Directors, elected every two years by the general membership. The officers, in turn, are elected by the Directors from their number. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its Board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in America and has a history of glorious achievement as the standard bearer in amateur affairs.

Inquiries regarding membership are solicited. Ownership of a transmitting station, while very desirable, is not a prerequisite to membership, a bona-fide interest in amateur radio is the only essential. Correspondence should be addressed to the Secretary.

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A Magazine Devoted Exclusively to the Radio Amateur

The Second National A.R.R.L. Convention

*Amateur Radio All Over North America Arranges For
Its Second Continent-Wide Get-Together.
Save Your Money and Come Along*

HEADS up and listen! We're going to have another joyfest of national proportions. From September 11th to 15th the Edgewater Beach Hotel at Chicago again becomes the home of a National A.R.R.L. Convention. Arrangements are being made for a crowd of at least 1500 for the banquet, which

look up the members of your own outfit, rig up your "rallying points" at the Edgewater Beach Hotel, register, get your badges and tickets and get all organized to make your part of the show worth while. If you haven't already got a hotel room that's the time to arrange for it—don't take chances on the second day.

PROGRAM

Sept. 11, Tuesday		Registration, Hamfest Day, and Stunts. All at Edgewater Beach Hotel.
Sept. 12, Wednesday	1:00 P.M.	(Undecided at this writing.)
	7:30 P.M.	Convention Banquet.
Sept. 13, Thursday	1:00 P.M.	Tours thru Broadcast Stations, probably WDAP and WJAZ.
	3:30 P.M.	Operating Department meeting; F. H. Schnell, Traffic Manager, as Chairman.
	7:30 P.M.	Technical meeting on transmitters. Devoted partly to amateur, partly to B.C. transmitters. (See list of speakers.)
Sept. 14, Friday	1:00 P.M.	Tours thru Chicago amateur stations.
	3:30 P.M.	The big stunt party—don't miss this!!
	7:30 P.M.	Technical meeting on receivers. Partly on amateur and partly on broadcast receivers. (See list of speakers.)
Sept. 15, Saturday	1:00 P.M.	(Undecided at this writing.)
	8:00 P.M.	"Night of Mystery" including initiation to Order of the Wouff Hong, the special stunt of the Order of Inkslingers, and the Grand Wind-up Party.

comes on the evening of the *first* day—but let us give you all of the program at once, as nearly as it has been arranged at this early hour, and then talk about the different items.

The First Day

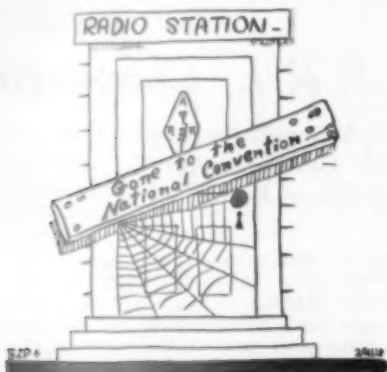
The 11th is Get-Acquainted-Day. Here's the time to make everybody know you are on the map. Get your stunts worked up,

What To Do When You Get There

As soon as you get off the train, head for the *Edgewater Beach Hotel*; everybody in Chicago knows where it is. Go to the Registration Desk, put yourself down on the books and get your book of tickets. This book will cost ten dollars and admits you to everything in sight on all four days. The convention management doesn't get a

cent from you after that; this includes *everything*, banquet, registration, badge, the stunt party, all the meetings, the trips to stations, the Wouff-Hong Initiation (if you wish), and the final grand night of mystery.

Then step over to the next desk and help save one-fourth the railroad fare for



the entire gang by having Mr. Wm. F. Marquardt, Jr., endorse your reduced fare certificate. This is important so we're giving you all the details.

Saving Railroad Fare

The following is a copy of the suggestions submitted for guidance in obtaining reductions in fares, as presented by the Central Passenger Association:

1. Tickets at the regular one-way tariff fare for the going journey may be obtained on any one of the following dates (but none on any other date): September 8-14. Be sure that when purchasing your going ticket, you request a **CERTIFICATE**. Do not make the mistake of asking for a "receipt."

2. Present yourself at the railroad station for ticket and certificate at least 24 hours before departure of train on which you will begin your journey.

3. *Certificates are not kept at all stations.* If you inquire at your home station, you can ascertain whether certificates and through tickets can be obtained to place of meeting. If not obtainable at your home station, the agent will inform you at what station they can be obtained. You can in such case purchase a local ticket to the station which has certificates in stock, where you can purchase a through ticket and at the same time, ask for and obtain a **certificate** to the place of meeting.

4. Immediately upon arrival at the meeting, present your certificate to the endorsing officer, Mr. Wm. F. Marquardt, Jr., as the reduced fare for the return journey will not apply unless you are properly

identified as provided for by the certificate.

5. *No refund of fare will be made on account of failure to either obtain a proper certificate nor on account of failure to have the certificate validated.*

Remember that it's up to you to get your certificate and to see that everyone else's gets to Mr. Marquardt. It will be your own fault if you don't get the refund by making everyone turn in his certificate. When properly endorsed this certificate will entitle you to purchase a return ticket home for half fare.

League Headquarters

Right alongside the registration desk and Mr. Marquardt's desk will be a Headquarters' Desk where you can find out almost any old thing you want to know about the League. If you catch any non-members or any "news-stand members" anywhere on the grounds, drag them over to this desk and get them converted and equipped with a Membership Certificate.

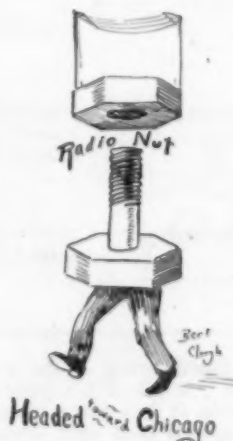
The H.Q. gang will be on the grounds too. Here's your chance to meet them—and to tell them the things you think they ought to know.

Banquet

Banquets are always the grand introduction time and introductions are needed at the *start*, not the *finish*, of a convention. That's why this one happens on the *first night*; then you can start the next morning knowing everybody in sight. This is Matty's idea and we think it is a peach.

Whom You Will Meet at the Banquet

You will not only meet amateurs from every district from Canada and maybe



from Mexico, but we're going to have a goodly share of the Division Managers, the Board of Direction, and some of the leading radio authorities. The Order of Inkslingers

will be there too. Who are they? Come and find out.

Exhibits

The radio exhibits *aren't going to be*. This is not a radio show but four days of friendship and fellowship, in which we will learn some things from people who really know, see some stations that are really different, get acquainted with the second city of America, but above all meet each other and trade ideas. There's nothing like a face to face meeting to show you what a fine fellow the American amateur is, to renew your faith in his fine future, and to fill you full of enthusiasm to go home and put over the cause of Amateur Radio.



Bring a Gang

All over the country plans are being laid to come to the convention in bunches. Get in on this idea and bring everybody in sight, members, non-members, and BCL's; they'll all be good members when they leave. This convention is going to be the finest little member-getter you ever saw. Wear your League pins, work up a local stunt to bring with you, and make everybody there know that your gang is in town.

Who's Running This Convention

The convention is being staged by the Chicago Radio Traffic Association, whose president is the A.R.R.L. attorney, Mr. Irving Herriott. The C.R.T.A. is an association of amateurs, commercial radio men, and also broadcast station operators and owners. It is the outfit that polices the ether in Chicago and works hand-in-hand with Supervisor-of-Radio Beane. The C.R.T.A. is the descendant of the famous old Chicago Radio Executive Council but is a much bigger and more powerful organization.

The convention committee has been chosen from the ranks of the C.R.T.A.; if in this story we have overlooked anything, write or wire the proper committee men. Here they are:

W. E. Schweitzer, Chairman, (9AAW), 4264 Hazel Avenue.

R. H. G. Mathews, Programs, Chicago Radio Laboratory, 332 S. Michigan Avenue.

M. W. McRae, Treasurer, J. A. Callanan, C. E. Wright, and Wm. F. Marquardt, Jr., Chicago Radio Traffic Ass'n., 959 The Rookery.

Stunt Party

One of the high spots of the Convention!

We won't tell you much about this except that its going to be a riot. Just a hint—one of the stunts will be for several hundred fellows with loop sets to start hunting a concealed sending station. Can you imagine what this will be like when they get scattered all over the North Shore?

And that's a good time for you to blossom out with your own stunts—not that the party won't be a hummer anyway, but the more the merrier.

Station Visits

The world's biggest broadcast station, WJAZ, is right at the Edgewater Beach Hotel. It was designed by old amateurs and is the product of the Chicago Radio Laboratory, the outfit that began at old 9ZN with Matty ("WO") and Karl Hassel ("SF") as the whole force. It's run by Clausung (an old Ohio '8') and was engineered by West of old 8AEZ.

Just down the line is another ham-operated broadcast station with a national reputation—WDAP of the Drake Hotel. It'll be wide open to the convention.

And amateur stations too—especially 9AAW, and listen gang, Schweitzer has just added a 500-cycle tube set to the loudest rock-crusher in captivity. We have a sneaking notion it's the big brutal set that used to be at 9ZN and it'll be worth seeing. Maybe we get to see 9KP, that has several times been heard in New Zealand on phone.

Outside of that you can take the Chicago North Shore and Milwaukee and run out to Great Lakes Naval Training station where there's more apparatus at NAJ—including the famous spark set with the universal-wave; you know, that one where the operator sets the pointer at 952 and the audience tries to guess if the wave is supposed to be 200 or 4000. They have a variety of respectable sets out there too and it's a mighty interesting place to visit anyway.

Speakers

There are just two formal meetings, one on transmitters and one on receivers, but both are split between amateurizing and broadcasting. Among the speakers expected are:

Dr. J. M. Miller of the U.S. Naval Radio Research Laboratory, Washington, D.C.

Mr. W. C. White, Tube Laboratory, General Electric Co.

Dr. Galen McCaa of 3ZO.

Mr. Frank Conrad, Asst. Chief Engineer,



Westinghouse Elec. & Mfg. Co., 8XK and guiding genius of KDKA.

Dr. E. F. W. Alexanderson, General Elec. Co., Engineer-Designer on the Alexanderson Alternator, and inventor of the Multiple Tuned Antenna.

Mr. Bowden Washington of Cutting and Washington, inventor of the trouble-proof ships' transmitter.

Mr. M. B. West, pre-war 8AEZ, designer of the famous Zenith transmitter WNP that Mr. is taking to the Arctic.

Mr. Ross Gunn, Radio Engineer, U.S. Army Flying Field, Dayton, O., one of the few men that know anything about amateur antennas.

Mr. Leroy M. Clausing, Chicago Radio Laboratory, and responsible for WJAZ.

Schedule

Matty and Schweitzer have solemnly promised that this convention will come closer to running exactly on program than any other convention ever held. That means you know exactly when and where to go.

Games

The old 9ZN lot and the grounds of Edgewater Beach Hotel provide plenty of room for pickup baseball games, and it is only twenty steps to Lake Michigan where swimming contests may be held. Plenty of equipment and a professional director of games will be handy to help everybody get located and keep things humming.

Initiation to Order of the Wouff-Hong

The initiation to the A.R.R.L. National Order of the Wouff-Hong takes place on the last night, September 15th. Arrangements are in the hands of the founders of the order, the gang from Flint, Michigan.

The Grand Wind-up

The Wouff-Hong initiation will be followed by a grand wind-up in the form of a party called "The Night of Mystery." The Chicago gang have kept as mum as oysters about this and it is really a mystery. Don't miss it!

Make 'Em Know U R There!!

There won't be any doubt about Texas and California—you will *know* they are there—even if they have to wreck the banquet to prove it. Come to think of it, two states and the 3rd Radio District furnished all the excitement at the First National. What's the matter with everybody else? C'mon and snap out of it!! Bring an alligator and a carload of palms from Florida, let the Kalamazoo gang wear kitchen stoves, the Washington delegation lumberman's shirts and the Kansans ten-inch sunflowers. At that we will bet that California beats them out with some wild

idea and Texas grabs the center of the stage by getting pinched for carrying .45s.

Look at Michigan; they are staging the entire Wouff-Hong initiation; the lil' ol' Order of Inkslingers will hand you a startler of their own, and we know of one pair of fellows—no, that's too good to give away.

Just because you happen to be coming in a group of one don't give the idea up—we still remember with joy the splash that a lonesome "5" made at one eastern convention.

Come on and start warming up the phone and telegraph wires—if you hustle to beat the band it is still possible to get a stunt worked up before you leave. If you run short of time do it in Chicago, fix up a "central point" for your gang to gather around, and right there hold a rapid-fire meeting and rig up the loudest badge and the wildest stunt you can think of. There won't be the least trouble about getting whatever you need to stage it; the only thing you can't buy in Chicago is a sour look and a cold welcome.

S.K.

Sidelights on The Transpacifics

IN our last issue it was told how the signals of American amateurs crossed the broad Pacific by the dozens in the recent tests with Australia and New Zealand.

It has now come to light that 6CGM, who was one of the first ten to get across, was using a single five-watt with one lone ampere in an antenna fifty feet high! Surely the person who said "There are unlimited possibilities in a five-watt tube" was not far from right.

The unofficial list of calls heard in Australia and New Zealand, printed on page 7 of August QST, were copied by H. Kingsley Love, Ferncroft Ave., Melbourne, Australia, chairman of the Australian test committee and president of the Victoria Section of the Wireless Institute of Australia; Maxwell Howden (3BQ), Ensleigh, Hill St., Box Hill, Victoria, Australia; Wallie Gee, Devonport, Auckland, New Zealand; R. J. Orbell, 154 Heaton St., Merivale, Christchurch, New Zealand; and F. D. Bell, Shag Valley Station, Waihemo, Otago, New Zealand. All credit is due these men in copying such a splendid list of calls. One Australian amateur alone copied twenty-two calls during the tests.

"Receiving conditions in Australia during the first two weeks of the tests were the worst I have ever seen here," said Mr. Love. Unusual weather conditions prevailed and static prevented the logging of many calls.

In a later letter to the *Radio Journal* Mr. Love urges us to endeavor to arrange for the President of the United States to send a message of greeting to the Governor General of the Commonwealth of Australia via amateur radio. "This action would bring the matter officially under the notice of both our governments," he says. Arrangements will be made to include this feat in the fall tests as proof of our ability to put messages across the Pacific.

6KA-6XBC is louder in New Zealand than NPG's arc, and even louder than NPM, Honolulu, which is a couple of

thousand miles closer, according to Mr. Orbell. He often receives him without his tubes oscillating—hearing the plain A.C. note. A receiver with two stages of radio amplification, detector and one reflex audio stage is used.

Hawaiian amateurs are already listening on schedules for New Zealand and Australian amateur transmitters. By the time this issue is out we would not be surprised to hear that they have connected up and relayed a message from the U.S. to Australia and received a reply. Would you?

H.F.M.

Daylight Transcons

JUST as the sun comes "over the hill" on the morning of September 23rd, the A.R.R.L. will start the second series of Daylight Transcons. At least ten messages will be started from the Atlantic Coast and as many will start from the Pacific Coast.

We are going to try to relay messages clear across the country between sun-rise and sun-set on the above date. It happens to fall on Sunday and there is no reason why every amateur who has a transmitter should not take part in this relay. There will be plenty of messages for everybody.

No one will know from what stations the messages will start. There will be no picked stations to handle the relay. Everybody will have the same chance of picking up a message and relaying it along the line.

One of the things that disappointed Headquarters in the last Daylight Transcons was the lack of definite information as to what stations handled the messages. Logs submitted to Headquarters were few and far between. This time we want more logs—we want every one we can get. The information desired is that pertaining only to the Transcon messages—nothing else. Keep a record of everything you hear concerning any of these messages. Keep the time and be sure and let us know whether you use standard time or daylight saving time. All logs should be in Hartford not later than October 1st as the story will appear in the November issue of *QST*.

The Nodal Point Explained

By H. F. Mason, Department Editor

THERE is an unnecessary amount of fog in the average amateur's mind regarding the nodal point, the factors influencing its position, and the importance in a modern amateur tube transmitter of its being located correctly. Because it is an adjustment that really should be made at the time the antenna and counterpoise are first put up, there is a call for a little "straight dope" on this subject.

What Is a Nodal Point?

Before attempting to ascertain why the nodal point should be at a certain place in the antenna system let us get a good, clear understanding of what the nodal point is. Refer first to Fig. 1, where are shown curves of voltage and current in a simple vertical one-wire antenna. Their value at any point can be measured by the horizontal distance from the solid vertical line. The curves show a maximum

current flowing at the base of the antenna, tapering off to zero at the upper end, while the voltage is 90 degrees out of phase, maximum at the top and a minimum at the bottom.

A nodal point may ordinarily be defined as a point in a vibrating body that is free from vibration. In an antenna system, the nodes or nodal points are places in the circuit where there is no current flowing, or places where there is no potential between that point and the earth. Conversely, points of maximum voltage or maximum

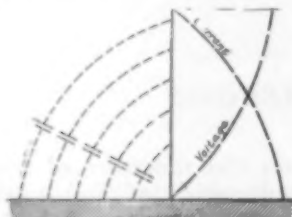


FIG. 1

current are called antinodes. In Fig. 1 there is a current node at the upper end, a current antinode at the base, a voltage node at the base and a voltage antinode at the far end of the antenna.

Referring again to Fig. 1, each foot of wire in an antenna acts as one plate of a condenser with the ground as the other plate. The intervening air is the dielectric. The capacity of the condenser so formed will depend upon the distance between the plates. In other words, the capacity to ground per foot of antenna will be greatest at the base of the antenna, and a minimum at the high end. Assume now that the antenna is excited at its natural period by a tube transmitter. As the electricity flows upward in the antenna, each little condenser mentioned above receives an electric charge. These charges flow to ground by means of displacement currents in the condensers. The current flowing at any point in the antenna will therefore be the current at the ground less what has been lost by displacement currents on the way up to that point. Thus the current gradually tapers off to zero at the upper end.

The antenna voltage, however, follows another rule. At the base of the antenna there is a heavy current flowing and, as stated above, the capacity between each foot of the wire and the ground is large. For this reason it is impossible for a voltage to build up at this point. At the upper end of the antenna, however, the only way that the current can get to ground is by a long and low-capacity path through the air. This causes it to back up, so to speak, and it builds up to a high potential. This can better be illustrated by a fitting analogy. If a dam in a river has a large hole in it a strong current or stream of water will

flow but the potential or height of water behind the dam will be low. This is what happens at the base of the antenna. Now on the other hand, if the hole in the dam is small the current of water will be small and the potential of the water behind the dam will build up. Its height will become greater and greater until finally it will overflow and cause destruction. This is exactly the condition at the upper end of the antenna. The brushing point of the antenna corresponds to the point at which the dam overflows.

The point to remember is that a voltage-node is a point at ground potential. As long as the antenna is connected directly to the ground there will always be a voltage-node at the ground.

The Effect of Loading Coils and Series Condensers

If a helix is connected into the antenna the curves will change and the voltage curve will then appear as at C, D, E in Fig. 2A. The curve is quite steep between D and E, showing that there is a large voltage drop across the helix. The node is still at the same place—the ground.

When a condenser is connected in series with the antenna the voltage curve changes again and looks like the one shown in Fig. 2B. The voltage, of course, reverses thru the condenser and this is shown by the curve which crosses over from right to left at this point. The original voltage node at the ground is still there but a second one has appeared at the point N, a little ways above the condenser. This upper node is what this article talks about.

In actual practice the series capacity shown in Fig. 2B is usually replaced by the capacity between the counterpoise and

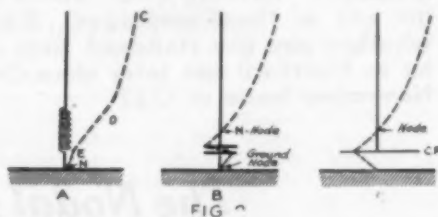


FIG. 2

the ground underneath, Fig. 2C. Then, when the helix is added the curve of voltage will be somewhat as shown in Fig. 3A or 3B. Figure 3A illustrates how the nodal point will be low down on the antenna system when a large counterpoise and a few turns of helix are used. When the opposite is used (any turns of helix and a small counterpoise) the nodal point will be raised as in Fig. 3B.

Now the wave length can be the same for the two arrangements and yet the position of the nodal point is not the same. This shows that it is possible to move the

nodal point up and down on the antenna without changing the wave length. Before telling how to do this it is well to see where the nodal point *should* be.

The Best Location for the Nodal Point

What is the best position for the nodal point and why? To begin answering that question let us look at Fig. 4A which shows an ordinary Hartley circuit with the antenna and counterpoise so proportioned that

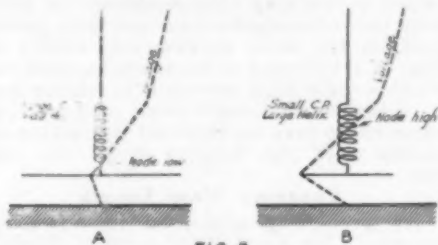


FIG. 3

the nodal point is at Y, four helix-turns above the filament tap. The result is that the oscillating energy generated in those four turns does not all appear as current to ground through the counterpoise—quite a bit of it strays off thru the filament tap to the secondary of the filament transformer and then goes wandering off down the 110-volt line hunting for a ground connection. Now anyone can see that the 110 volt line is a perfectly rotten ground,

has been used. Then connect this ground wire (or some other temporary ground wire) to one side of a hot-wire- or thermammeter, to the other side of which is connected a length of flexible wire as in Fig. 5. Now feel up and down the helix, also the antenna and c.p. leads, with the "feeler contact" while the set is running. When the contact touches the nodal point there will be no current thru the meter in the ground lead, nor will there be any change in the antenna current as shown by the regular antenna ammeter. When the feeler is touched to *any* other point of the antenna system there will be current through the ground lead, also the antenna current and the wave length will change.

The nodal point may be located roughly by putting a meter in the ground lead and another in the counterpoise lead and reading them at the same time. If the meters read the same, and both meters are OK, the nodal point is half way between the meters. If they read differently the nodal point is nearer the meter that reads higher. This method may be understood when it is remembered that the nodal point is not only the place where the *voltage* is lowest but also the place where the *current* is highest. It is a good idea to do all this testing with low power.

How to Shift the Nodal Point to the Right Place

We found that current flowed off through the filament transformer and the 110-volt line because the nodal point was *not* at the filament connection. It looks off hand as if

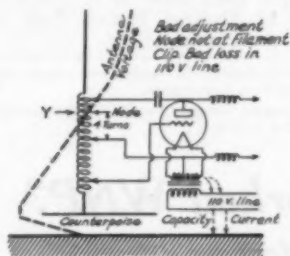


FIG. 4A

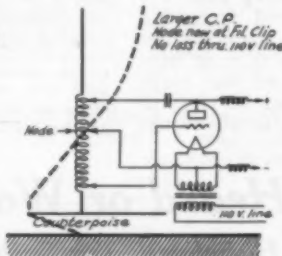


FIG. 4B

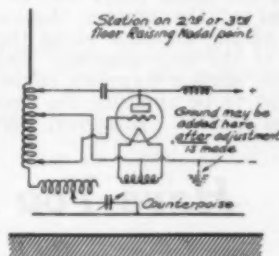


FIG. 4C

and an even worse counterpoise; it will waste lots of energy and the range of the station will be cut down. It does not matter what the sending circuit is—Hartley, Colpitts, Reversed-Feedback or plain freak;—as long as we keep this thing from happening the set will send farther. And the way to keep it from happening is to *put the nodal point right at the filament clip*. Then there will be no voltage to make current sneak off thru the filament transformer and the power line.

How to Find the Nodal Point

Before beginning to hunt for the nodal point take off the ground connection if one

the way to correct this is to move the filament clip to the nodal point. But that will not work—because the antenna, plate and grid clips have to be moved too so as to keep the wave and the tube adjustments the same and at the end we are just where we started—4 turns off the nodal point.

To lower the nodal point (if it is above the filament clip) make the counterpoise larger so as to cover more territory and then cut down the number of helix turns to keep the wavelength right. If things are very badly out of adjustment you may also have to shorten the antenna to bring the nodal point to the filament tap. This is shown in Fig. 4B.

To raise the nodal point (if it is below the filament clip) lengthen the antenna. If that is too unhandy, or runs the wave too high, put a condenser in the counterpoise lead and then put in series with it a counterpoise loading coil (helix with a clip) as shown in Fig. 4C. Adjust the series condenser and the counterpoise load till the nodal point and the wave length are both right. Instead of using the series

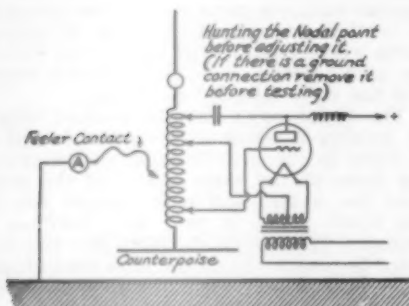


FIG. 5

condenser it is possible to cut down the capacity of the counterpoise itself by raising it farther off the ground. Of course it is also possible to make the capacity smaller by putting the wires closer together or making them into a cage and it has been actually found that with a cage counterpoise the nodal point will be very near the center of the system, measured from the end of the antenna along the wires to the end of the counterpoise. This is very nice if the station happens to be at the right height to be opposite the center of the antenna system. However, that is about the

only excuse the cage counterpoise has for existing; the large well-fanned-out counterpoise is much superior. The only trouble with the large counterpoise is that the nodal point will be low in the system, which is all right if the station happens to be on the first floor but all wrong if the set is way above the counterpoise. If one has a really good variable condenser that will stand high voltages, one with practically no losses,† the nodal point may be nicely raised by putting this condenser in series with the counterpoise lead and then getting back on the wave as described before (in Fig. 4C) by using a counterpoise load coil. However, for high powers it is mighty hard to make a condenser stand up‡ and the same effect may be obtained by raising the counterpoise but keeping it of the same size.

Changing Wave Length

As previously explained in our pages (See QST for April, 1923*, page 24, "Getting the Transmitter Down") it is possible to change wave quite easily with such a system as we are describing if there is an ammeter and a condenser in the antenna lead and another in the counterpoise lead. It is then necessary only to swing the two until the proper wave is hit with the currents in the c.p. and antenna leads alike. On the very short waves (under 150 meters) no other apparatus will be needed, but for the ordinary amateur waves between 150 and 200 it may be necessary to use a loading coil in the c.p. lead as before explained. It sounds complicated but after one gets used to it the wave can be shifted at request faster than the receiving operator can follow.

†Allen-Cardwell makes to order one that will stand 5000 volts and has low losses.

*Can be obtained from the QST Circulation Dept. at the regular price.

Have You Heard or Worked WNP?

By F. H. Schnell, Traffic Manager

WE'VE had some pretty rotten weather to work thru with WNP. July has been one of those months where there ceases to be a good night—if one gets a good hour once in ten days, he should feel elated.

A half dozen stations have worked WNP and perhaps a dozen have been successful in hearing him, in spite of this most miserable weather; and it cannot remain forever, so just as soon as WNP heads north and west we look for better two-way communication. Already Mix is hearing West Coast stations. On the 29th of July the following message was delivered by 1AVK in person:

Nr 1 fm WNP via 1ANA-1AVK

To Schnell

Logged 6CMR and 6PL stop 50 miles west of Godthaab Greenland

Mix

We feel that not enough attention is being given to logs. Stations hearing WNP are asked to send in detailed logs for a monthly compilation in QST. In this way it is an easy matter to keep the rest of the country informed as to what stations are doing good work.

The log for the month of July follows:

Log of A.R.R.L. with WNP

July	E.S. Time	Call	QSS	QRN	Remarks
3d	10:40P	1FD	B	H	Heard WNP for about 3 hours working 1ZE.
	11:00P	—	N	H	N. C. Theobald, Attleboro, Mass., Heard WNP.
	11:00P	—	N	H	J. A. Baker, Claremont, N. H., heard WNP.
	11:30P	1UJ	NR	H	Rec'd msg. and sent one to WNP.
4th	12:30A	1CKP	S	M	Heard WNP 150 ft. from phones at times.
	3:30A	1ZE	B	H	Rec'd 300 words code.
	11:15P	4JE	NR	VH	Heard WNP (4JE QRA Porto Rico).
5th	2:10A	1CPI	N	NR	Worked WNP.
	3:30A	1ZE	S	H	Rec'd 300 words code.
	10:45P	1FB	VB	VH	Rec'd short msg. from WNP.
	11:04P	1MO	VB	VH	WNP barely audible.
	—	*2FB	VB	VH	Heard WNP.
	11:38P	9BJT	N	VH	Heard WNP.
6th	1:35A	2CQZ	NR	NR	Rec'd 200-word msg.
	1:39A	1ANA	N	M	Worked WNP. (WNP QRA entrance to Straits of Belle Isle).
9th	2:30A	*1AR	NR	NR	Rec'd 2 code msg. Sent one to WNP.
	2:30A	9AIO	S	M	Heard WNP.
	9:45P	1ANA	S	M	Heard WNP.
10th	12:05A	1ANA	S	N	Rec'd 500 words code. (WNP QRA eastern entrance Straits of Belle Isle).
11th	12:30A	*1AR	N	N	Worked WNP. (WNP QRA Battle Harbour, Labrador).
	1:13A	1ANA	VB	VH	Worked WNP.
12th	11:35P	1ZE	VB	VH	Worked WNP.
15th	9:30P	*1AR	N	N	Worked WNP (WNP QRA Grady Harbour, Lab.)
17th	10:40P	1ANA	N	H	Rec'd 500 words code.
	10:10P	1BCF	S	M	Heard WNP.
	10:11P	ex-1ARP	N	N	Heard WNP.
20th	9:20P	1ANA	B	H	Worked WNP.
22d	12:03P	1ANA	S	H	Rec'd 3 msg., sent 1.
23d	11:20P	1ANA	B	VH	Worked WNP.
24th	12:03A	1ANA	VB	VH	Worked WNP.
	12:25A	ex-1ARP	VB	VH	Heard WNP.
	11:20P	1ANA	S	H	Rec'd msg. from MacMillan to President Harding. (WNP QRA Jack Lane's Harbour, Lab.)
25th	1:30A	1ANA	S	H	Rec'd 500 words code.
28th	1:20A	1ANA	B	M	Rec'd 1 msg., sent 2 to WNP. (WNP QRA about 50 miles west of Godthaab, Greenland).

Legend:

QSS: N=None; S=Slight; B=Bad; VB=Very Bad; NR=No Report.

QRN: N=None; L=Light; M=Moderate; H=Heavy; VH=Very Heavy; NR=No Report.

*Canadian.

Just as we were about to send this down to the print-shop the postman gave us a letter and a list of calls heard by Mix. The letter speaks for itself:

Battle Harbour, Labrador,

July 12, 1923.

Messrs. K. B. Warner es F. H. Schnell—
Dear Fellows:

Left Sydney at 5:05 P.M. on Tuesday, July 3, heading across Cabot Straits for Cape Ray. At about 9 o'clock, connected up with 1UJ and had him phone to Bristol

and got answer back in ten minutes. At 11:30, hooked up with 1ZE and started a 500-word code msg. QRN so bad however that when dawn arrived we had only half of it over so postponed the rest until the next morning. Midnight of the 4th found us off Bonne Bay, Newfoundland. Fog was thick all day the 5th but we finally anchored at 8:00 P.M. behind Long Point in Brador Bay near Greenly Island on the coast of Labrador at the entrance to the Straits of Belle Isle. At 6:00 P.M. we sighted our first iceberg and when we anchored there

were several about us. The wind was blowing a gale the 6th and fog was thick too, so rather than run a chance of mixing with a berg or two in the Straits, the captain decided to remain at Long Point for the day. At 12:35 A.M. connected up with

than any weather heretofore. Right after midnight in the early A.M. of the 10th, got another 500 word code message off to 1ANA. Aside from these, we received several personal messages for members of the crew.

Am enclosing list of calls heard and worked. Will have to make this rather short as the post office closes in a half hour and we are leaving tomorrow at 2:00 A.M. for Grady—a 15-hour run from here.

We are up among the big bergs now and the Captain agrees that we have counted well over a thousand bergs since we entered the Straits. Mac says he has never seen bergs as far south or as numerous as they have been so far on this trip. It is pretty cold, too; have to wear a couple of sweaters all the time. All the hills around here are covered with snow. Have had a chance to get some pretty good pictures and would suggest you ask Milton if you want to see any of them.

Radio conditions have been as poor as I have ever seen them so far. Fading and QRN have been unmerciful and infinite credit should be given to the fellows who stood by hour after hour copying that dry coded stuff, through that awful hash. 1ZE, 1ANA, 2CQZ and 1UJ are sure bricks.

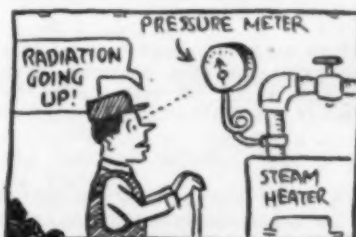
1ZE has been the most consistent so far, as was expected, but the signals of several other stations at greater distances have been considerably better when they did come in. 4FT still bumps in fine but have been unable to raise him. I still believe that we will copy the bunch all winter long and only have doubts as to the transmitter reaching you, but considering the weather, etc., think it remarkable to have done what we have. 1ANA has some very good sigs here as has also 2CQZ. Good ops, too.

Well, fellows, will have to quit now. Will drop you a line from up the line a bit. My very best 73's to everyone down there and thank the fellows who have stood by for us, for me.

As ever,
Don.



2CQZ and he took a plain language press message. Weather cleared up the 7th and we got off at 4:45 A.M. heading through the Straits. Weather began to get hazy around the horizon so we put into Red Bay at 11:30 A.M. At 3:15 A.M. of the 8th, we left Red Bay and started up through the Straits again for Battle Harbour. The weather began to thicken in the early afternoon, as well as increased number of bergs, so we turned back about 5 miles to Henley Harbour, anchoring at 3:15 P.M. We had to go back two miles farther as the nearest entrance into the harbor was entirely blocked by ice. Fog and ice kept us anchored at Henley Harbour all day. The next day dawned clear as a bell and we got off at 3:00 A.M. arriving at Battle Harbour at 9:00 A.M. On this last run up, ran through a heavy ground swell which rolled us around to a much greater extent



3BHM WASHINGTON, D.C. IS A CHURCH JANITOR WHILE ATTENDING COLLEGE

How to Make a Good 70-foot Mast

By C. R. Sawyer, 1GL

THERE are two things that are of interest to every amateur; quality and low price. In this article the writer has endeavored to show how real radio masts can be made that are not only cheap but are also good. These masts were designed by the writer for his own station but the ones described

pieces of angle iron $2" \times 2" \times \frac{1}{4}"$ should be inserted as shown in the drawing. These make a socket for the base of the mast.

The mast is built of clear stock. Spruce is best, but whatever you use be sure it has nothing but small knots. The uprights are made of strips $2" \times \frac{3}{8}"$ nailed together with the lapped joints reinforced by means

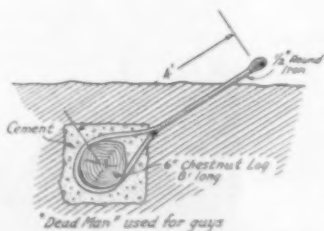
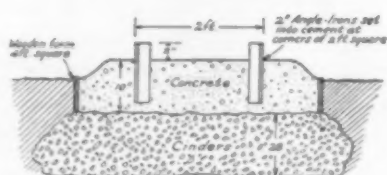


FIG. 1 MAST FOUNDATION AND "DEAD MAN"

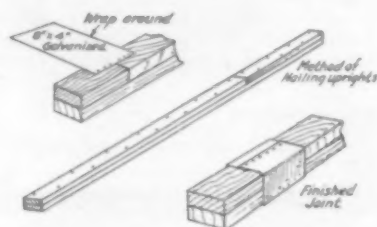


FIG. 2 ASSEMBLING THE CORNER PIECES

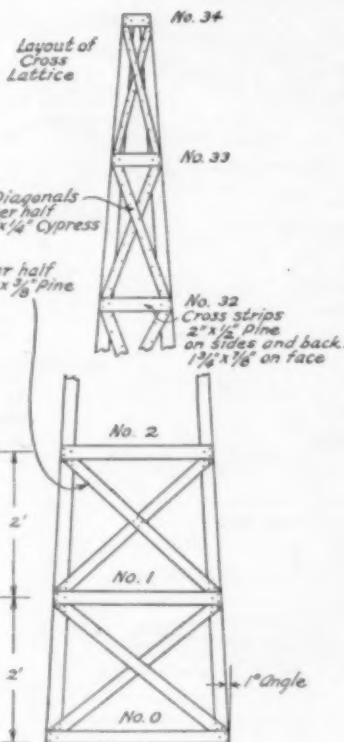


FIG. 3 ASSEMBLING ONE SIDE OF MAST

No. of Cross Strips	SIDE LATTICE	FACE & BACK
0	2 3/8"	2 3/8"
1	2 1/2"	2 3/8"
2	2 1/8"	2 3/8"
3	2 1/4"	2 3/8"
4	2 1/8"	2 1/4"
5	2 1/8"	2 1/4"
6	1 9/8"	2 1/8"
7	1 9/8"	2 1/8"
8	1 8/8"	1 9/8"
9	1 7/8"	1 8/8"
10	1 7/8"	1 8/8"
11	1 6/8"	1 7/8"
12	1 6/8"	1 7/8"
13	1 5/8"	1 6/8"
14	1 5/8"	1 6/8"
15	1 4/8"	1 5/8"
16	1 4/8"	1 5/8"
17	1 3/8"	1 4/8"
18	1 3/8"	1 4/8"
19	1 2/8"	1 3/8"
20	1 1/8"	1 2/8"
21	1 1/8"	1 2/8"
22	1 1/8"	1 1/8"
23	1 1/8"	1 1/8"
24	1 1/2"	1 1/2"
25	8 3/8"	9 3/8"
26	8 3/8"	9 3/8"
27	7 3/8"	8 3/8"
28	7 1/8"	8 1/8"
29	6 3/8"	7 3/8"
30	6 1/8"	7 1/8"
31	5 3/8"	6 3/8"
32	5"	6"
33	4 7/8"	5 7/8"
34	3 7/8"	4 7/8"

were the later and better ones erected at 1ADL, the station of Mr. Harold Rice, to whom I am indebted for the drawings.

The first thing is to prepare a foundation as shown in Fig. 1. Dig a hole about 3 feet deep and 4 feet square. Fill the bottom with cinders, well tramped down; then put in the wooden form, allowing it to stand about 4 inches above the ground. The form should have a level top so that after it is filled with a 3 to 1 mixture of Portland cement and clean sand it can be leveled off. Before the cement sets, four

of strips of 24 gage galvanized sheet iron nailed on with galvanized nails as shown in Fig. 2. Before any assembling at all is begun all the pieces are given a good coat of outside paint.

One side of the mast is assembled first. It will be necessary to have a long, smooth place the length of the mast to do this in. Two chalk lines 70 feet long should be stretched along the ground or floor where the assembling is to be done. The lines should be spaced 24" at one end and 5" at the other end. Two of the

Financial Report

IN accordance with instructions of the Board of Direction the following statement of revenue and expenses of the A.R.R.L. for the quarter ending April 30, 1923, is presented for the information of the membership.

K. B. Warner, Secretary.

Condensed Statement of Revenue and Expenses, Feb. 1, 1923, to April 30, 1923

REVENUE		
Advertising sales	\$16,966.57	
Newsdealer sales	10,503.80	
Dues and subscriptions	6,021.22	
Back numbers, etc.	634.48	
Emblems	474.00	
Interest on bank deposits	57.04	
Bad debts recovered.....	107.11	
		\$34,764.22
Deductions		
Returns and allowances.....	\$582.71	
Exchange and collection charges.....	8.34	
Discount 2% for cash.....	220.93	
		811.98
		\$33,952.24
EXPENSES		
Publication expense	\$13,953.09	
Salaries and commissions	10,329.47	
Forwarding expense	477.33	
Telegraph, telephone and postage.....	1,375.91	
Office supplies and general expense.....	2,337.01	
Rent, light and heat.....	399.82	
Traveling expenses	2,311.02	
Depreciation of furniture and equipment.....	89.36	
Bad debts written off.....	1,556.29	
Public stenographers at meetings	798.90	
Operating Department field expenses	301.81	
Publicity Department field expenses	122.25	
		\$34,052.26
Net loss from operations.....		\$100.02

Getting Away from 200 Meters

How QST and the Bureau of Standards Will Help

By S. Kruse, Technical Editor

ALL of you will agree that 200 meters is not the best amateur wave. I can hear the chorus.

But only about five out of each district will agree that the really good amateur waves are all below 200 meters. But as the man with the .45 Colt

said to his restless audience, "I aint argyin', I'm tellin' ye."

There isn't much chance to argue: 100 meter signals fade much less than 200 meter ones; they travel almost as well in daylight as at night; they get into dead spots where the 200-meter stuff never

arrives—in other words they can do anything that 200 meters can and have almost none of the bad habits of our pet wave. If you don't believe it let's look back through QST. (It's surprising what a lot of questions can be settled that way. How would it be to work that idea a little harder?)

Look at "Exploring 100 Meters" on page 12 of QST for March, 1923*, and at "Getting the Transmitter Down to 100 Meters" on page 24 of QST for April, 1923*. You will find there a story about a 100-Meter CQ Party, a first experiment with a brand-new wave length. But look at the results in the first part of "Calls Heard" on page 75 of QST for March, 1923*. Why, most of us never have gotten that far with 200-meter work after fiddling with it for years! Who said the short waves did not get out? What? Someone still doubtful? All right, look at that story, "Bureau of Standards Explores Short-Wave Region," on page 74 of QST for July, 1923*. Notice that KDKA's 100-meter set, with about 2/3 of the power the big set uses, has been "running rings around the big set"? Not once in a while but every day. Same at some other stations.

Yes, sir! we have been barking up an empty tree. There's nothing for us in this long-wave business. Our real hard luck is that we can't use the waves between 50 and 100 meters where the best work is possible and I, for one, feel decidedly sore at the arbitrary prohibition that keeps anyone without an "X" license from working below 150 meters. But let's do the best we can and work down towards 150 at least.

The Set

Now that's settled. How do we get down?

The receiving set is easy, look at "Some Tuners that work Below 200 Meters," on page 25 of July, 1923, QST*.

The sending set is not quite so easy but several good circuits are shown in the articles already referred to and, in addition, there is the capacity-coupled set of 8XK and 8VN (page 22 June, 1923, QST*); and finally the beautiful arrangement of the Meissner circuit used at 6JD and described on pages 8 and 9 of last (August, 1923) QST*.

An Amateur Wave-Meter

Most of the so-called amateur wave-meters try to cover too much territory; the little 150-200 meter band is all bunched together in the lower half inch of the scale. If you don't want to take wire off the coil of your present wave-meter let's make one. The coil will have a single layer of 16 turns of No. 14 D.C.C. wire wound on a good heavy pasteboard or wooden (not composition) tube 4 inches in diameter. Don't

*Can be obtained from the QST Circulation Dept. at the regular price.

use any dope on it at all; just put a light coat of collodion or varnish on the tube before winding so the wire will stick. Use a good variable condenser of .0005 microfarad capacity. To get freshened up on what a good condenser is look at "The Variable Condenser" on page 70 of QST for June, 1923*. Use a little flashlamp for an indicator if you can't afford a thermogalvanometer but please, please, don't hang the coil out on long floppy leads that change the wave 50 meters every time they are moved. Take a look at the box-type Jewell meter or the little \$10.00 General Radio meter and follow that idea. *The leads must all be solid and husky.*

All Set But—

Now the sets are ready and we have a wavemeter, but the wavemeter has no scale and we don't know where 150 meters is any more than before. In fact most of us don't know where 200 is—never did. How are we going to put a scale on that wavemeter so we can tune up?

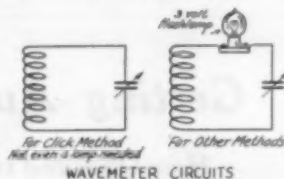
Bureau of Standards Helps

The first standard-wave signals of WWV, Bureau of Standards station at Washington, reached out in fine style. That more fellows did not use them is our fault—we allowed an awful "bonehead" to happen in the schedule on page 28 of July, 1923, QST*—we left off the dates, which were July 17 and August 15. Naturally a lot of folks listened every night for a week, heard nothing and quit, but the few that hung on found that WWV certainly gets out.

Some more schedules have been arranged, especially for us, and this time we are not leaving off the date.

How to Use the Signals

First read over "U.S. Will Send Standard Waves for A.R.R.L." on page 28 of QST for July, 1923*. Then here's another simpler method suggested by the Bureau. Start by putting your wave-meter coil close to the tuner secondary (or to the antenna



coil if it happens to be a "single circuit" tuner). Now tune in some C.W. station that will keep going for a while, get a good strong signal and then turn the tuning knob (condenser or variometer) slowly until the pitch of the signal drops very low or goes out entirely. The tube should still be oscillating, and if everything is right, the pitch of the signal will go up rapidly if the tuner knob is turned either

way. This is the "zero-beat" adjustment. When you have it, start turning the wave-meter knob *slowly* and at some point there will be a sharp click, showing that the wave-meter has run into tune with the tuner (and the signal) and upset things. If there are two clicks the coupling between the wavemeter and tuner is too close; if there is no click at all it is too loose; sometimes one turn of wire must be wrapped right around the wave-meter coil and connected in series with tuner coil.

waves on Oct. 7. Be sure your tuner goes down to 150; don't try to blame WWV.

Reports

Remember—we need detailed reports of results obtained on each wave. Shoot them in to the headquarters office after each test, as the Bureau wants to use them for information in arranging future tests. Maybe other stations will send if the reports are good—and perhaps there will be weekly tests.

New Standard-Wave Schedules

Eastern Standard Time		Night of Sept. 13-14 Wave (Freq.)	Night of Sept. 28-29 Wave (Freq.)	Night of Oct. 7-8 Wave (Freq.)
P.M.				
11:00-:04	QST Call			
11:04-:08	Test	705 (425)	600 (500)	222 (1350)
11:08-:11	Announcement			
11:15-:19	QST Call			
11:19-:23	Test	600 (500)	428 (700)	200 (1500)
11:23-:26	Announcement			
11:30-:34	QST Call			
11:34-:38	Test	450 (666)	333 (900)	187 (1600)
11:38-:41	Announcement			
11:45-:49	QST Call			
11:49-:53	Test	352 (850)	273 (1100)	176 (1700)
11:53-:56	Announcement			
A.M.				
12:00-:04	QST Call			
12:04-:08	Test	300 (1000)	231 (1300)	167 (1800)
12:08-:11	Announcement			
12:15-:19	QST Call			
12:19-:23	Test	240 (1250)	200 (1500)	158 (1900)
12:23-:26	Announcement			
12:30-:34	QST Call			
12:34-:38	Test	200 (1500)	176 (1700)	150 (2000)
12:38-:41	Announcement			

Notes: In the table—"Wave" means wave length in meters.

"Freq." means frequency in kilocycles or thousands-of-cycles per second.

All announcements are made with both key and phone.

All sending by WWV, straight C.W. or phone.

This is called the "resonance click method" and is very accurate, also very rapid after just a little practice.

Making the Wavemeter Scale

When you have learned to use the "resonance click method" you are all ready for WWV. Tune him in and when you have adjusted the wave-meter to get the click, mark the *exact* position of the pointer and label it with the wave WWV has announced. Practice it by checking up on the tests of Sept. 13 and Sept. 28. This gives you a chance to get all set for the AMATEUR



9DAE, R.F.D. 1, WARRENSBURG, MO.
RAISES PIGS, STOCK AND CORN

The Trans-Canada Relay Tests

By A. H. Keith Russell, 9AL, Ontario Division Manager

The glorious accomplishment of the Canadian amateurs in putting over the real Trans-Canada Relays in middle April has received but the scantiest mention in QST. We have been keenly aware of this, and while offering our humble apologies to our Canadian members we must say in our own defense that heretofore we simply have been unable to secure a connected account of the affair. Mr. Russell here tells the story very interestingly from the standpoint of a Toronto observer. For next month we are promised a report from one of the leading Montreal amateurs. The Canadians shall have their credit in QST for this job if it takes until Domesday to get it in; we only regret the unconscionable delay.—Editor.

THE second Trans-Canada Tests were a complete success in every way. From the writer's observations the following is a pretty good line on what was doing.

The first night messages were handled between 5GO and 9BP on the coast and 4FN and 9BX on the prairies, 3NI at Fort William, and 2HG at Montreal. Contrary to previous expectations 3NI was able to work right into Montreal steadily all three nights of the tests and hence the Toronto stations were rather sidetracked in the big message traffic. However, on this night they successfully handled the message started from Niagara Falls (the southernmost portion of Ontario and Canada) addressed to 9BP, the farthest north Canadian station known of, and the answer also was successfully shoved through; this being handled by 3TL, in the Falls, and 3JI and 9AL in Toronto, up to 3NI, and back via 9BX and the same route.

On the second night also many messages were shot through from Montreal to the west and vice versa, via the usual 2HG-3NI-9BX route. Very little work was done in the Toronto section as the stuff was going over our heads. It is un-

derstood, however, that some messages on one of the nights in question were handled from Montreal via 3HE, Kingston, and from him to 3KO in Chatham and thence to 3NI.

The third night was the best of the lot. And on this night we achieved the long-looked-for real Transcontinental message from Coast to Coast (Montreal can hardly be considered the East Canadian coast). It is not definitely known here if messages were sent from Halifax west-bound via Montreal, but in Toronto after very hard work on the part of 3GK communication was established with 1BQ in Halifax, and a message taken from him. At the same time that 3GK was working 1BQ, 9AL was working 9BX so that immediately upon receipt of the Halifax message, 3GK gave it to 9AL from where it was immediately relayed to 9BX who was standing by for it.

The best time established for a message from Montreal westward to the Coast is understood to have been about 20 minutes. 9AL, 9BX, and 9BP ran a few test messages to see how fast they could be got from Toronto to the Coast, Prince Rupert, with the result that a message was

FILTER TESTS AT 3AJB, SWARTHMORE, PA.

FILTER	Antenna Current	SIGNALS		REMARKS
		3JB-4 Miles	3BOB-2 Miles	
None	3	Heavy Hum	Heavy Hum	Tubes Hot
	3	Somewhat Better	Very Little Better	Tubes Hot
	2.95	Much Better	Much Better and Sharper	Tubes Fair
	2.95	No Hum	No Hum Very Sharp	Tubes Cool

LEGEND—C₁ and C₂ each 2 microfarads C₃—1 microfarads

L₁—2 pounds No. 22 enameled on 1" x 1" x 6" iron core.

L₂—1500 turns No. 20 on each leg of core with 1/2" x 1/2" legs and 3" x 3" window.

L₃—1/2 Henries

sent and an answer returned from 9BP in six and a quarter minutes.

Communication was maintained steadily all night with both coasts by 3NI, and 5GO reported 9AL also very QSA, there and copied some of the messages direct that were being sent through 9BX and 4FN. The star stations and the absolutely essential ones for this work were un-

doubtedly 3NI and 9BX, without whom it would have been very difficult to work with any degree of regularity. As it was there was practically no trouble in working right ahead at all times, and often two alternative routes were both handling traffic at the same time, i.e., 3NI-9BX-9BP and 9AL-4FN-5GO.

Altogether a glorious three nights.

Final Report on the Fading Tests' ---Part II

(Concluded from August QST)

VI—The Final Analysis

The conclusions given in the first part of this article were based on the first part of the tests only, and do not always agree with the final analysis. Where there are differences it is likely that the final analysis is more nearly correct as it includes three tests as against one each for the July and October analyses.

Method of Final Analysis

The final analysis was made by means of the Tabulating Machines of the U. S. Bureau of the Census. Briefly the system of analysis consisted of punching a special card for every observation-card turned in by a recorder. The punch marks on this special card were so arranged as to indicate the information given on the original card. The finished cards were then stacked together and sorted by means of the Census Bureau's machines, which picked out the cards in any desired fashion. For instance, it would take out all that show heavy fading; then these "heavy fading" cards were counted or were run thru again with the machine set to take out all of them that were gotten while there were clouds at the receiving station; then the cards were re-assembled and another sorting begun.

Number of Records

After all the defective cards had been thrown out there remained 5,684, of which

Table 5

Wave Length	Number of Observations	Cases of Bad Fading	Percentage Bad Fading	Cases of Loud Signals	Percentage Loud Signals	Cases of Bad Strays	Percentage of Bad Strays
250	2701	873	32.3%	508	18.8%	368	13.6%
375	1965	511	26.0%	321	16.4%	259	13.2%

¹First publication of the final analysis of the Bureau of Standards—A.R.R.L. Fading Tests. Abstracted from the (unpublished) Scientific Paper of the Bureau of Standards called "A Study of Radio Signal Fading," by Dr. J. H. Dellinger, Chief of Radio Section; L. E. Whittemore, Alternate Chief of Radio Section; and S. Kruse, former Associate Engineer, Bureau of Standards. Abstract by permission of the Director, Bureau of Standards.

2,701 were for 250 meters, 1965 for 375 meters, and 1018 for other waves.

Table 6
Effect of Barometric Conditions on Fading

Severity of Fading	Changing Barometer	Stationary Barometer	Up or Down Gradient	Along Isobars
None	26.2%	25.0%	5.1%	14.7%
Bad	30.6%	27.0%	31.4%	26.6%

A changing barometer at the transmitting station does not affect the fading. Fading is greater when the transmission takes place up or down the barometric gradient.

Table 7
Effect of Barometric Gradient on Signal Strength

Signal Strength	Along Isobars	Up or Down Gradient
Weak	18.7%	23.3%
Strong	20.4%	20.4%

Waves which travel along the isobars produce stronger signals than those travelling up or down the barometric gradient.

Table 8
Effect of Temperature Gradient on Signal Strength

Signal Strength	Up or Down Gradient	Along Isotherms
Weak	23.6%	19.8%
Strong	15.5%	20.1%

Transmission along the isotherms is slightly better than up or down the temperature gradient.

Table 9
Effect of Temperature Gradient on Fading

Severity of Fading	Up or Down Gradient	Along Isotherms
None	14.5%	28.6%
Bad	85.5%	71.4%

Transmission along the isotherms tends towards less fading. Note: Transmission

along the isobars is slightly less conducive to fading than transmission along the isotherms, as indicated by a comparison of Tables 6 and 9.

Table 10
Effect of Clouds on Fading

Severity of Fading	Cloudy at Transmitting Station	Clear at Transmitting Station	Generally Cloudy	Generally Clear
None	7.4%	8.2%	26.4%	29.3%
Bad	31.0%	29.1%	30.5%	21.7%

Table 10 indicates that clouds at the transmitting station have no effect upon fading. It also shows that if it is generally cloudy at and between the transmitting and receiving stations, the fading is more likely to be bad than when it is clear.

Table 11
Effect of Clouds on Signal Strength

Signal Strength	Clouds at Transmitting Station	Clear at Transmitting Station	Clouds at Receiving Station	Clear at Receiving Station	Generally Cloudy	Generally Clear
Weak	11.6%	12.3%	20.8%	23.2%	22.2%	21.6%
Strong	6.3%	4.9%	18.0%	16.8%	17.5%	17.2%

Table 11 indicates that clouds at the transmitting station have no effect upon signal intensity. It also shows that clouds at the receiving station are conducive to stronger signals. Generally cloudy weather at and between the transmitting and receiving stations has no effect upon the signal strength.

Table 12
Effects of Clouds on Stray Intensity

Intensity of Strays	Clouds at Receiving Station	Clear at Receiving Station
Weak	18.8%	19.2%
Strong	11.2%	8.8%

Table 12 indicates that clouds at the receiving station produce stronger strays.

Table 13
Fading

Number of Observations	Zero Fading	Slight Fading	Medium Fading	Bad Slow Fading	Bad Fast Fading
1251	4.6%	16.8%	29.2%	46.0%	3.4%

Table 13 gives the percentage occurrence of zero, slight, medium, bad slow, and bad

fast fading. Inspection shows a tendency in weak signals to bad slow fading.

Table 14
Fading and Wire Lines

Severity of Fading	Percent having wire lines nearby
None	47.2%
Bad	46.7%

Table 14 indicates that the presence of nearby wire lines has no effect upon fading.

Proximity of Stations

In the January tests, two transmitting stations in the same locality sent the same test simultaneously but at slightly different wave lengths, the intention being to note whether the fading of these two stations exhibited any similarity. In some cases, the two sending stations were found to fade simultaneously, in other cases they seemed to be fading exactly inversely, that is 180° out of phase, and in still other cases the curves obtained by nearby recorders were entirely unlike. Inasmuch as the pairs of transmitting stations of the January tests were operated on *slightly different* wave lengths, it was thought that there might be a possibility of dissimilar fading due to this cause. Accordingly in the April tests, the transmitting pairs were operated on the *same* wave length, but each with a distinctive spark note. The results of these tests were much the same as the previous ones; that is, the two stations did not fade simultaneously in all cases.

VII—Theories of Fading

Absorption Along Heavieside Surface

Several theories regarding radio signal fading phenomena have been propounded. A preliminary discussion based on the results of this investigation was given by two of the authors before the Philosophical Society of Washington on Jan. 29, 1921.² This theory takes account of the presence of the Heavieside surface in the atmosphere above the earth.

The idea of an upper conducting surface between which and the earth's surface electrical waves would be propagated, antedates the use of radio for long-distance communication, since it was discovered by Fitzgerald in 1893 and by Heavieside in 1900. Considerations largely independent of radio phenomena suggest the structure and boundaries of the atmosphere depicted in Fig. 6.

(1) The earth's surface, a relatively poor conductor.

(2) The troposphere, about 10 kilometers thick, within which are the causes of our meteorological phenomena, and an atmosphere similar to that which we breathe.

²"Radio Signal Fading Phenomena," by J. H. Dellinger and L. E. Whittemore, *Journal of the Washington Academy of Sciences*, Vol. 11, No. 11, June 4, 1921.

(3) A radioactive layer, separating the troposphere from the region above it. (The existence of this layer is not as well established as the others, nor is its existence so important in the explanation of the radio phenomena).

(4) The stratosphere, or isothermal layer, having a thickness of approximately 100 kilometers. The stratosphere is ionized by the sun's rays in the daytime but quickly loses this property by the recombination of the ions at night.

(5) The Heaviside surface, permanently ionized, and an almost perfect conductor.

The boundary of the Heaviside surface is not considered as absolutely horizontal, but as changing from time to time. The permanently ionized region above the Heaviside surface is the region of per-

regions the waves may vary rapidly in intensity. Small irregularities would affect short waves more than long waves.

Observations to date indicate that the fading is greatest for waves within a certain range of wave lengths, and is less for either longer or shorter waves. Fading is more pronounced at wave lengths in the neighborhood of 250 meters than at longer wave lengths. Transmission experiments using 100-meter waves indicate less severe fading than on 250 meters. This may give an indication of the magnitude of the irregularities of the Heaviside surface.

It is easier for a large mass of something to somewhat obstruct a 200-meter wave than a 2000-meter wave.

If this theory be correct the maximum intensity received at night should be that

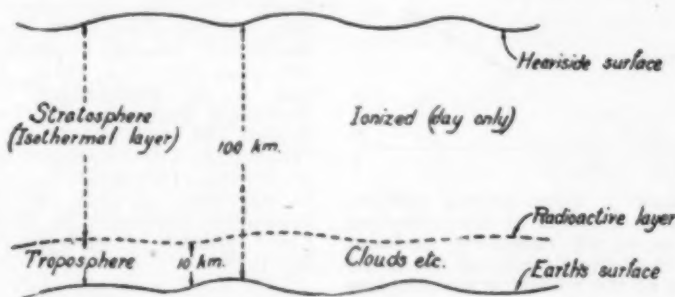


Fig. 6.
Vertical Cross-Section of the Earth's Atmosphere.

manent aurora, and is so good a conductor that waves can not penetrate it. Any waves reaching it can only slide along it, just as waves slide along the even less perfectly conducting surface of the earth.

In daylight transmission, the waves can not reach the Heaviside surface because of the intervening ionized stratosphere, and hence only those waves which travel along the earth's surface are useful during the daytime. In traveling along the earth's surface the waves are diminished in intensity by absorption of their energy in the earth. At night, on the other hand, the waves may reach the Heaviside surface, and slide along it without appreciable absorption.

Because of the variable absorption which may be introduced by the irregularities of the Heaviside surface and the adjoining

given by the transmission formula with the absorption factor equal to unity.

Tests recently reported by Nichols and Espenschied³ substantiate this theory.

Thus, while the transmission formula can not predict the varying intensity of signals observed at night, it can and does give the limiting maximum value that can be obtained at night. If the daytime value of the absorption co-efficient is known⁴ it also gives a limiting minimum value.

A preliminary statistical study of the transmission range of certain broadcasting stations⁵, which has been made since the work described in this paper was done, indicates that at a distance of the order of 150 miles from the transmitting station a noticeable decrease is observed in the signal intensity, which increases again for greater distances. The distance at which this occurs varies with the wave length, which suggests that its explanation is associated with the variation of ground absorption with wave length and that the signals received at distances beyond this minimum point are due to the propagation along the Heaviside surface. Further tests of a similar nature should throw more light on this phenomenon.

³"Radio Extension of the Telephone System to Ships at Sea." Proc. I.R.E., Vol. 11, p. 193; June, 1923.

⁴The value of this absorption co-efficient has been determined by Austin (Scientific Paper of the Bureau of Standards, No. 159, 1911) for daytime transmission over sea water to be 0.000047, when d and λ are both expressed in meters.

⁵"A Preliminary Statistical Study of the Range of Radio Transmitting Stations," by C. M. Jansky, Jr., abstracted in QST for June, 1923, page 33, under the title "Concerning Amateur Interference with Broadcast Reception."

Reflection and Interference

A variation of this theory of fading has been proposed by one of the authors and was discussed in a paper presented at the meeting of the Radio Club of America, in New York on Sept. 24, 1920*. This theory is based upon the principle of the production of interference bands in the vicinity of the receiving station by the reflection of the waves from any reflecting surface such as a cloud or fog bank or from the

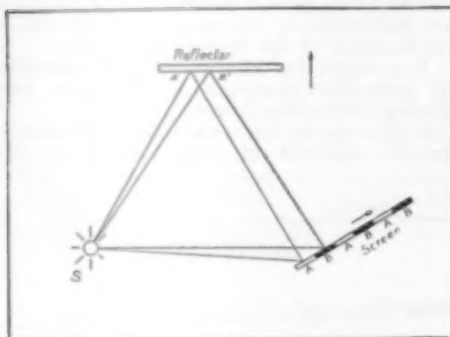


Fig. 7

Heaviside surface or other ionized surface. The movement or shifting of this reflecting surface, or series of reflecting surfaces, would result in the movement of the interference bands at the receiving station (see Fig. 7), and the production of the fading phenomenon. We should expect cloud and fog banks to reflect short waves more than long waves, since such banks are more nearly comparable in size with the shorter wave lengths.

Changes in Direction

Experiments conducted at Anacostia, Washington, and Chicago during the fading tests indicate that direction changes of the short waves here considered are negligible and do not enter into the causes of fading†.

VIII—Acknowledgments

The authors desire to acknowledge most heartily the assistance rendered by the officers and members of the American Radio Relay League in carrying forward these tests. The work has given results not only in the form described in this paper but in the way of experience which is of value in organizing tests on the transmission

*"The Bureau of Standards—A.R.R.L. Tests of Short Wave Radio Signal Fading," S. Kruse, QST, p. 8, Nov., 1920, and p. 13, Dec., 1920.

†In this connection see the following:

"Variation in Direction of Propagation of Long Electromagnetic Waves," by Lt. Comdr. A. Hoyt Taylor, U. S. Bureau of Standards Scientific Paper No. 353.

"Radio Direction Changes and Variations of Audibility," by Carl Kinsley and Albert Sobey, Proc. I.R.E., Vol. 8, 299-323, August, 1920.

range of radio broadcasting stations now in progress.

Special acknowledgment is due to Messrs. F. H. Engel and H. C. Forbes for their work on the statistical analysis of the records and the compilation of the paper in its present form. Other members of the Bureau of Standards staff who have assisted in the work are: F. M. Baer, H. M. Shaffer, M. S. Strock, E. B. Shea.

Department of Commerce,
Washington, D. C.

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HOW TO MAKE A GOOD 70-FT. MAST

(Concluded from page 18)

Cost of Materials for One Sixty-eight Foot Mast at 1ADL

100 Board ft. 1½"x¾" Clear Spruce, planed and finished....	\$11.00
126 ft. Clear Pine, planed and finished, 2"x½"	8.00
80 ft. Cypress Lath.....	4.00
5 lbs. 5d Com. Nails, 5 lbs. 3d Com. Nails60
6 qts. White Lead.....	4.00
600 ft. #10 Galv. Wire.....	1.50
48 White Strain Insulators.....	4.00
10'-1"x¼" Strap Iron for Bands..	2.00
4 Chestnut Logs.....	1.60
28'-½" Round Iron.....	2.80
5 bags Cement.....	4.50
4-2½" Angle Irons 8" long.....	1.40
8-¼" Galv. Rope Thimbles.....	.40
1-¾" Galv. Wire Rope.....	.80
1-Galv. Wire Rope Sheave.....	1.00

Total.....\$47.60

DON'T FORGET

when purchasing railroad tickets to the National Convention, to ask for a certificate. It will enable all of us to save money on our return fare.

The Best Dimensions for Amateur Antennas

By Ross Gunn¹, M. S.

At last some real information on the right size for the antenna. In reading this article it is well to notice especially that the same rules do NOT apply for sending and receiving antennas. Sending antennas are to be worked 5 or 10% above the fundamental while the receiving antennas can be worked 50%, or more, above the fundamental. In other words—make the sending antenna small enough so that its natural wave length is 90% of the wave you wish to work on, but make the receiving antenna still smaller so that its fundamental is not over 60% of the working wave. Try it and see.

IN QST for May, 1923*, the writer suggested an approximate method for determining the best wave length for a given antenna. This paper is a report on the experimental proof of the method previously outlined. The actual result naturally differs slightly from the values predicted but the agreement is good and indicates the proper point to be used in practice.

The Problem

The problem, briefly stated, is to find at what wave length the maximum power is received for a given amount of power in the sending antenna. The problem cannot be solved by the simple process of listening at some receiving set while the sending wave length is changed; the received signal would then depend upon the receiving system, and this is undesirable if the constants of the receiving set are not known. (In other words, the receiving set may be very good or very bad at some waves and give a false idea of the way the sending set is acting.—Tech. Ed.) The received power must actually be *measured* if the results are to be of real value. When the best wave has been found in this way we can not only tell how to change this antenna to make it work better at some other wave but we can also get a good idea of the size of the antenna for any amateur wave length.

The System

The system in this case was to send with a known amount of power in the antenna and to measure the power that was received by a loop some distance away. The best wave is of course the one at which a certain number of watts (say 100), at the sending end, will put the largest amount of power into the receiving loop.

The Sending Set

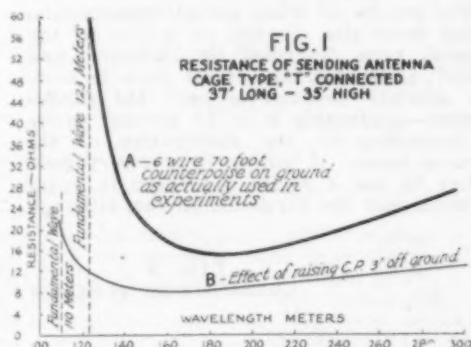
The transmitter used in this investigation was of the conventional master-oscillator C.W. type, used with a "T" type cage antenna 37 feet long and about 35 feet high. For the test a counterpoise of six wires 70 feet long was laid directly on the ground. The fundamental of this combination was 123 meters.

The Receiving Set

The receiver used was a loop and condenser connected to a "Ferron" (FeS) crystal detector and a Paul galvanometer as shown in the diagram (Fig. 2).

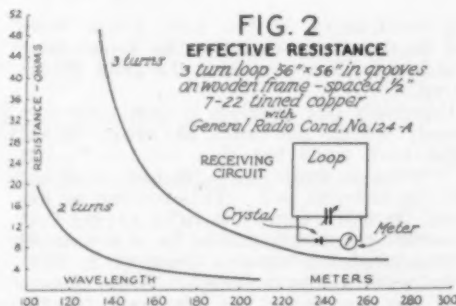
The Experiments

The effective resistance-wave length curves were plotted for both the transmitting an-



tenna and the receiving circuits. These are shown in Figs. 1 and 2.

The power input (i.e., watts in the sending antenna) at any wave length was found by multiplying the effective resistance by the square of the antenna current for the



particular wave length used at any one time. Actually a given power was chosen and the proper current was used to give this power. The receiver had to be cali-

¹Pre-war 820, now Radio Engineer for U.S. Army at Dayton, Ohio, flying field.

*Can be obtained from the QST Circulation Dept. at the regular price.

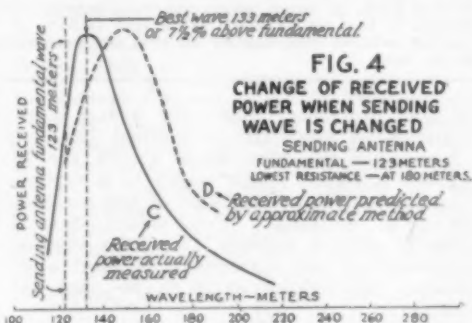
brated rather carefully and it was found that the deflection of the galvanometer was proportional to the square of the received current. In order to obtain the received power all that was necessary was to multiply the deflection by the resistance at the wave length used.

Knowing the power that was put into the antenna (a constant), and the power received, a curve was plotted showing how the ratio of received power to antenna input power varied with wave length. Obviously the best wave length to transmit on would then be the wave length where this last curve reached maximum. This curve is shown as "C" in Fig. 4. The similar curve computed by the method proposed in the May QST* is shown in dotted lines at "d", Fig. 4. The agreement between these two curves is good, considering the large losses in the antenna used.

Conclusions—Sending Antenna

The results of these actual experiments, which were also checked on a loop of the general type described by Dunmore and Engel², show that the correct place to work the average antenna is near the fundamental—preferably 5 to 10 percent above it depending on the distribution of the various losses. I believe it is a very poor policy to use a series condenser in order to work near the fundamental for, although

The actual carrying out of the above simple process was attended with various experimental difficulties which cannot be gone into here, but it must be pointed out that for this sort of work the receiver must be several wave lengths away or "phony" results will be obtained.



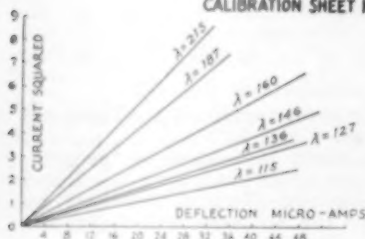
Counterpoise

An interesting point which has no direct bearing here is that the resistance-wave-length curve of the sending antenna was changed from Curve A (Fig. 1) to Curve B simply by raising the counterpoise 3 feet off the ground, no attempt being made to get the best arrangement. Obviously the counterpoise in the raised position gave a combination that was almost twice as good as the original counterpoise (lying on the ground) which was used for these tests.

The function of a receiving antenna is quite different from that of a sending antenna. The receiving antenna is not to radiate but to collect energy and pass it on to the receiver. It should be small enough so that it can be worked at the point of lowest resistance, for it is here that the greatest amount of energy is transferred to the receiver. If it is worked near the fundamental most of the energy will be re-radiated. (That checks the opinion of the gang as given on page 41 of the May issue of QST*—Tech. Ed.)

FIG. 3

CALIBRATION SHEET FOR RECEIVER



mica condensers of the best grade were used in these experiments, the losses they caused more than overcame the good effects desired.

(Generally our problem is the other way around; we do not want to know "What is the best wave for this antenna?", but "If I want to work on --- meters, how big shall the antenna be?" This too can be answered from Mr. Gunn's work by saying that the sending antenna should have a natural ("fundamental") wave of about 90 to 95% of the working wave length. Some dimensions are suggested at the end of the article.—Tech. Ed.)

*Can be obtained from the QST Circulation Dept. at the regular price.

²See QST for July 1923, page 75, "Bureau of Standards Explores Short-Wave Region."

Antenna Dimensions

By S. Kruse, Technical Editor

THE tables given below are reasonably accurate, being based on good authority. Naturally the exact wave length of an antenna changes with the height of the counterpoise, also with the nearness of the antenna and the counterpoise to houses, trees, guy wires, and power lines.

The direct-coupled tube sets that most of us use require too many turns in the antenna circuit. The only way to get them down near the "best working point of the antenna" is to use a series condenser. It does not make any difference whether we

Sending Antennas

Top—Four wires on 9-foot spreaders.

Downlead—Four wires in cage 6 inches across.

Counterpoise—Four wires on 9-foot spreaders 10 feet off ground, length same as top and connected identically with top.

If antenna is to be higher, shorten top to keep wire length same.

Fundamental (Best wave according to Ballantine)	1.1 times fundamental (Best wave according to Gunn)	Effective Wave length Range	Height above ground in feet	Length of L-type top	Length of T-type top
100	110	100-125	40	35	40
125	137	125-150	40	55	60
150	165	150-175	50	75	80
200	220	200-225	60	100	110

Receiving Antennas

Wire running horizontally and used with ground connection.

Length includes lead-in and ground lead.

Wave length to be received

Length of single wire

50- 100 meters

Not over 25 feet

100- 150 "

" " 40 "

150- 200 "

" " 60 "

200- 600 " (broadcast)

" " 120 "

600-2400 "

" " 500 "

Above 2400—Loop better, unless Beverage Wire is used.

use Mr. Ballantine's idea of working on the fundamental, or Mr. Gunn's of working on 1.1 times fundamental—we still run into this difficulty. Series condensers do not help, for Mr. Gunn points out that the best mica condensers are not good enough, and as yet we have not seen any ads. of a .0005 microfarad variable air condenser to stand 5,000 volts or better. (We know of one, tho.)

The best way out is to use a master-oscillator circuit or else some sort of loose-coupled circuit. It is no trick to change to a Meissner circuit, like 6JD's, (see *QST* for August*, pages 8 and 9) or to loose-couple an ordinary reversed-feedback or Hartley circuit as shown in the description of 8AQO on page 16 of *QST* for February*.

or the little spark-tube set at 2BCF on page 55 of *QST* for March*. And then there's the 8XK circuit, on page 22 of June *QST**. Any one of these will let you get right down toward the best wave of a large antenna and incidentally cut out about 94% of your grief from Broadcast Listeners who are tired of key-clicks and 60-cycle grumbles. If anyone has doubts about the goodness of these circuits he is invited to explain the performances of 6JD, 6KA, 7BJ, 8AQO, 8XK, 8VN, and KDKA. That doesn't complete the list—it is just the first handful of star loose-coupled stations that we happened to think of.

*Can be obtained from the *QST* Circulation Dept. at the regular price.

A.R.R.L. on the Yukon

How the League Assisted in Bringing Radio to an Alaskan Mission

"**C**'MON-IN-A-MINIT," said K.B.W., poking his head around the corner of the door.

"OK," said I, just like I was OK-in' for a couple of messages, as I eased into the front office at *QST* factory.

"Meet the Reverend John W. Chapman," spoke K.B.

"Glad to meet you," said I, as I shook hands with a great big salubrious looking gentleman in ecclesiastical garb who looked me square in the eye.

"Reverend Chapman is in charge of the Episcopalian mission at the little native village of Anvik, on the Yukon River in the interior of Alaska," K.B. began. "He has lived there for thirty-six years, and in

all that time has only been 'outside' five times. The only communication between Anvik and the outside world in the summer is by means of a boat that passes the village once a week. In winter the river is frozen over and the only contact with the world is by dog-team to Holy Cross, forty-five miles down the river.

"Mr. Chapman is a Jack-of-all-trades. He performs the office of sheriff, judge, and

what I want, and I'm willing to learn."

"Fine."

Then we proceeded to the details and, after some discussion, evolved a plan whereby A.R.R.L. headquarters would make the choice of apparatus and plan the set. Everything would be shipped to Seattle, Washington, where the set would be assembled and tested by A.R.R.L. members there, and be in readiness for Rev. Chap-



The Transmitter and its Builders, 7FD and 7UU

town physician in addition to his regular duties. He has even built a small sawmill, in order to saw out boards for houses, and has installed a Delco set so that Anvik may be modern and have electric lights.

"On his present trip, which, by the way, is his first visit to the States in seven years, he was impressed with the remarkable advances that have been made in the radio art since his previous visit. If radio can now bring news and music to thousands of American homes, why can't it do the same for the people of Anvik? And if amateurs can build transmitting sets and talk across the continent, why couldn't he have a set in the North that would enable him to communicate with the States by amateur radio occasionally?"

"That is the question. Mr. Chapman has come to us for the answer," K.B. concluded.

Silence prevailed for a time, and we thought the question over.

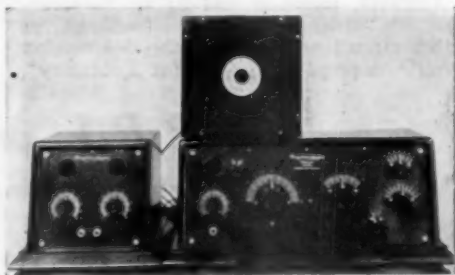
"What he wants is a regular ham layout, I take it," said K.B.

"A reg'l'r ham layout," I repeated.

"Well, I don't know what that means," said Mr. Chapman, "but I believe that is

man when he came through on July sixteenth on his way north.

The next day things began to move. We popped a wire to the Seattle gang; asked them if they'd like to tackle the job. "Sure-thing, we'll be glad to help," they replied, "Shoot us the dope."

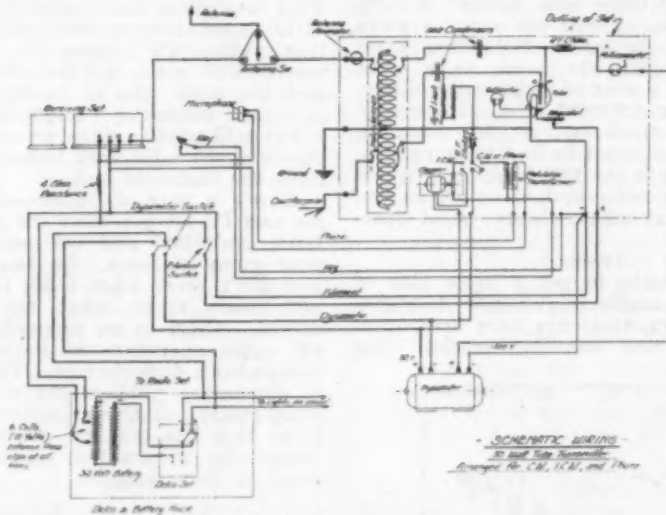


The Zenith Receiver

During the next week plans for the set were completed. Material and apparatus were ordered. Because of the unusual conditions attending the construction of the set, several manufacturers kindly granted

liberal discounts on the apparatus used. As fast as the parts arrived in Seattle, the operators of 7UU and 7FD devoted all of their spare time to assembling the transmitter. Although the time was short and there was much to be done, they wholeheartedly bent every effort towards finishing the set on time—and succeeded. On July fourteenth and fifteenth the set was

board" style and uses one fifty-watt tube. The Hartley circuit is used with grid modulation for chopper and phone. An Esco 175-watt 1000-volt dynamotor furnishes the plate voltage. For convenience all external connections are made to the terminal strip on the right hand side of the set. The wiring diagram shows the complete connections.



The Wiring Diagram

tested at 7UU. Their efforts were rewarded, for signals were reported loud and clear throughout the western half of the U.S. in spite of heavy static.

Our photograph shows the completed transmitter with its builders. On the left is Otto Johnson (7FD) and on the right Robt. Waskey (7UU), president of the Amateur Radio Club of Seattle. The set is assembled in the well known "bread-

By the time this issue is out, a regular ham antenna will be raised above the collection of little buildings at Anvik on the Yukon river; and when we hear the station on the air this winter it will arouse in us a feeling of pride because we know that we of the A.R.R.L. did our part towards making that station possible. It was a noble task, nobly done.

H.F.M.

Ham Traffic in Any Old Shack

The Old Man Hands You His Phones, While The Busy T.M. Goes Over the Ropes

By F. H. Schnell, Traffic Manager

THIS thing has a rather peculiar way of starting. For some time "LQ" has been rushing me at every turn, every lunch counter, and every morning, wanting an article on "how to handle traffic." I got so I could take square corners, eat lunch alone, and come in the back door every morning, thus avoiding him and his question. This scheme of dodging worked FB for about two months. Then it

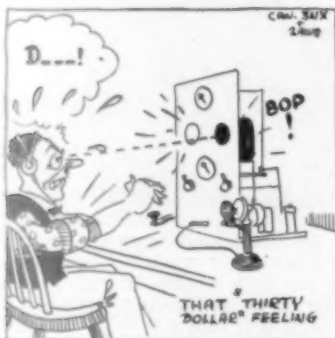
happened that I wanted some dope on a syphoning wave meter—wanted to use it to measure the wave lengths of some of our transmitters. "LQ" is the best man I could think of to go to for reliable information. I put my question up to him while he listened patiently and he answered me by saying, "Until you write that article I'll not give you dope on anything." I wanted a syphoning wave meter and I

wanted it badly, so badly that I sat up two whole nights trying to dope it out myself, but finally had to give in and write what follows before "LQ" would help me. More about the SWM later.

The Operating Department is governed by rules and regulations. Each member of the A.R.R.L. has been given a copy. There is a good supply on hand at Headquarters where those who haven't a copy may obtain one. There are certain ways of applying these rules, depending upon circumstances, just the same as a good painter applies a coat of paint using different methods for different jobs. Observe an "old timer" at work and you are learning from observation what he had to learn thru experience. He is the text-book from which you make your notes and, likewise, as you prefer good text-books, observe good operators.

Traffic

First, you ought to get a basic idea of what amateur traffic is and how it originates. For years, amateurs have been operating nightly and handling traffic. Our



traffic, in the main, consists of friendly messages going from one part of the country to the other. Messages may be filed by anybody with any amateur; he in turn will transmit and relay the message to its destination without charge. It's the fun we get out of relaying messages that repays us for our services—not the dollar. Sometimes the messages go clear across the country in less than an hour and sometimes it takes weeks to get a message from Chicago to Indianapolis, and sometimes they never get to their destination—it seems like someone has a sky-hook and spears some messages which we never see again.

The Old Man's Station

I suppose the best way to get a good idea of how to handle traffic is to get into an amateur station. Practical experience will help more than anything else. The Old Man, over in central Kansas, has a good C.W. transmitter; let's go over to his shack and handle some traffic. It's 10:15

and we'll get over there just in time to "open up." You see, we amateurs are not licensed to use our transmitters between eight and ten-thirty at night nor on Sunday mornings during local church services. This being Saturday night we'll find many stations on the air because the gang can sit up late and sleep in Sunday morning.

Tonight we have three operators, "DR," "PF," and "FS" over at The Old Man's. This is a good time to let you know that "DR" is an amateur who just started handling traffic; "PF" knows the code but little more; "FS" is the A.R.R.L. Traffic Manager and the gink who is conducting this expedition incidentally wondering how the SWM will work. Here we are at The Old Man's shack. He isn't home but we go in, light the filaments and—

Here's a pair of phones—listen in with me and I'll let you hear the gang at work. QRN isn't bad and we ought to hear a good many stations. Do you mean to say you don't know what QRN is? Oh, I see, you don't know what the abbreviation means. QRN is an abbreviation used by all radio operators to indicate static or atmospheric disturbances. The Department of Commerce publications will give you a complete list of abbreviations. You should have this list, as the abbreviations help immensely in amateur radio. We'll use more of them tonight.

An A.R.R.L. Broadcast

(We listen and hear 9ARZ open up with a QST.) That's 9ARZ over in Clear Lake, Iowa, sending an Official A.R.R.L. Broadcast Message. "QST" means a general attention call to all stations. In this particular case 9ARZ, along with about one hundred other good amateur stations, is broadcasting the latest news from A.R.R.L. Headquarters. This broadcasting of up-to-the-minute-news for all amateurs takes place every Saturday and Sunday night at ten thirty. This is the way we distribute news to our members. If you are in doubt about the stations within your range, you will find a complete list of our broadcasting stations in the Operating Department of this issue of QST. Pick out the station you hear best and copy the news.

(8ZW comes in.) That's "WX," one of the operators of 8ZW. "WX" is the fellow who kept the air quiet during the Transcontinental Tests. We all remember how he QRT'd the gang and you could see the "T" stick out something like this ———

—————"WX" is Strobel's personal sign which he uses to identify himself when working at any station. Notice how considerate he is of the other fellow. Apparently the operator at the other station is a newcomer so "WX" is sending slowly. Sometimes a man who thinks he is a speed merchant on the key doesn't like to work with slower operators. A good operator

is one who can clip it off at 30 per, but who also has the decency and common sense to slow down when the receiving operator requests it. Traffic can be handled no faster than the receiving operator can copy.

(4GL and 3JJ are hitting it off about 40.) No, you're mistaken there, that's not static, that's "Chain-Lightning Hill" of 4GL back on the air again. He and 3JJ are handling traffic. Yes, I know it sounds like static but both of them are speed artists and they understand each other perfectly. They rip messages off ten at a clip before you can throw your antenna switch. You'll hear some more like that—8IJ, 1CK, 1ZE, 3OU, 2WB, 8AWP, 7ZN, 6VX, 5FV, 1CKP, and many others often work that fast—but they are "old timers."

Message Forms

Good traffic men send messages in complete form; office of origin (the place where the message originates); date (date the message is filed); check (number of words in the text); addressee (name and address of party to whom the message is to be delivered); text (body of the message); and signature (name of party sending the message); these are always sent. In some cases date and check are omitted. Some of the messages of the "rubber stamp type"—("ur crd recd wl QSL ltr") which we talked about so much at conventions, don't need much more than an address. They are dropping off in big chunks and before long the gang will be back to regular traffic.

The Log

Don't forget to keep the log. What's a log? Why, it's a record book kept by all good operators to show exactly when everything happened at their stations. The left column is always used for the exact time. The Old Man is right up to date; he uses Official A.R.R.L. Log Sheets which are supplied to League Members at cost from Headquarters. To make it a bit easier T.O.M. uses two arbitrary characters; when he calls "CQ" he indicates it by placing an (X) right after the time he called and when he calls another station he indicates it by placing an (O) in the proper place. We don't find many (X's). (Arf! Some CQ hound is on.). No use waiting for him to sign. He calls "CQ" thirty or forty times at a crack without signing. He doesn't seem to know that he ought to sign once in a while. His traffic figure would be larger if he didn't "CQ" so much.

There's 1ZE! Give him a call. Call three times and sign three times like this "1ZE 1ZE 1ZE de T.O.M. T.O.M. T.O.M." If he doesn't answer the first time wait a minute or two and call again, but don't break your arm calling and don't spoil the air for others. When 1ZE answers, ask him if he

has anything going your way. Use the signal "QTC?". 1ZE is known as "Amateur Number One." He is a real old timer and he sends distinctly. We copy "T.O.M. T.O.M. T.O.M. de 1ZE 1ZE 1ZE GE OM QRK? QTC QRV? K." 1ZE says, "Good evening, old man, how do you receive my signals?; I have a message for you; are you ready to receive it?; go ahead." Tell 1ZE his signals are good and that you are ready for the message. "DR" sends: "1ZE de T.O.M. QRK QRV K." "DR" copies "T.O.M. de 1ZE Nr 1 fm Marion Mass. 1ZE to Mathes radio 7OE I have been working WNP nearly every night since he left Wiscasset sig 1ZE." The way to QSL (acknowledge) for that message is to send "1ZE de T.O.M. R nr 1 K," meaning that you have received message number one and (K) to go ahead with the next one. 1ZE has nothing more and "DR" copies "T.O.M. de 1ZE tks nm cul 73 gn," meaning "Thanks; nothing more; see you later; best wishes; good night."

Relaying

We have the message and we must relay it along. First we all locate 7OE by referring to the call book. We find Bremerton, Washington, is the place. Not

"MORE FUNNY CALLS" BY GUX		
1BAG <small>F.L. STAFFORD HARTFORD CONN. HIS CALL REMINDS U.S. OF SANTA CLAUS</small>	2COP <small>E.L. BROWN LONG BRANCH N.J. HIS CALL SOUNDS LIKE A PAIR OF POLICEMEN</small>	3ACE <small>C.P. KOON PORTSMOUTH VA. HIS CALL HOLDS A GOOD HAND</small>
4DX <small>THE STATION OF J.B. KNIGHT, JR. GREENVILLE, S.C. MUST BE FOR DX</small>	5ER <small>J.E. CAIN, JR. NASHVILLE TENN. HIS CALL IN A "TENN"</small>	6DR <small>S.E. ROBINSON OAKLAND 9 CALIF. SOUNDS LIKE A SICK DOCTOR</small>
7HE <small>THE BREEMERTON AMATEUR CLUB BREMERTON WA. SEVEN "HE" OPERATORS</small>	8IB <small>C.A. HENNE DETROIT MICH. HIS CALL SOUNDS LIKE EIGHT ROUNDS</small>	9BAR <small>H.D. MC COMBS CHEROKEE IOWA IS OUT OF DATE</small>

familiar with our geography we get out a map and find that the message must go northwest from us. It pays to know the location of stations and we keep an ear out for some 9 in the line of travel.

8IB comes in. Well, let's see where 8IB is. The call-book says Columbus, Ohio, and that is northeast of here and out of line. Higgy operates 8IB. Don't you remember his old gag "I used to be a six DM but now an eight I be?"

9ZN nearly breaks the diaphragms. "WO" is operating, you can tell by his nervous snappy sending. He sends like he talks when he is in a hurry.

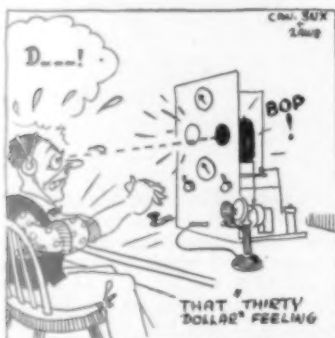
9AMB roars in. Give 9AMB a call. If you can raise him he'll put that message up in the 7th before an hour rolls by. He

wanted it badly, so badly that I sat up two whole nights trying to dope it out myself, but finally had to give in and write what follows before "LQ" would help me. More about the SWM later.

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An A.R.R.L. Broadcast

(We listen and hear 9ARZ open up with a QST.) That's 9ARZ over in Clear Lake, Iowa, sending an Official A.R.R.L. Broadcast Message. "QST" means a general attention call to all stations. In this particular case 9ARZ, along with about one hundred other good amateur stations, is broadcasting the latest news from A.R.R.L. Headquarters. This broadcasting of up-to-the-minute-news for all amateurs takes place every Saturday and Sunday night at ten thirty. This is the way we distribute news to our members. If you are in doubt about the stations within your range, you will find a complete list of our broadcasting stations in the Operating Department of this issue of QST. Pick out the station you hear best and copy the news.

(8ZW comes in.) That's "WX," one of the operators of 8ZW. "WX" is the fellow who kept the air quiet during the Transcontinental Tests. We all remember how he QRT'd the gang and you could see the "T" stick out something like this — — — — —. "WX" is Strobel's personal sign which he uses to identify himself when working at any station. Notice how considerate he is of the other fellow. Apparently the operator at the other station is a newcomer so "WX" is sending slowly. Sometimes a man who thinks he is a speed merchant on the key doesn't like to work with slower operators. A good operator

is one who can clip it off at 30 per, but who also has the decency and common sense to slow down when the receiving operator requests it. Traffic can be handled no faster than the receiving operator can copy.

(4GL and 3JJ are hitting it off about 40.) No, you're mistaken there, that's not static, that's "Chain-Lightning Hill" of 4GL back on the air again. He and 3JJ are handling traffic. Yes, I know it sounds like static but both of them are speed artists and they understand each other perfectly. They rip messages off ten at a clip before you can throw your antenna switch. You'll hear some more like that—8IJ, 1CK, 1ZE, 3OU, 2WB, 8AWP, 7ZN, 6VX, 5FV, 1CKP, and many others often work that fast—but they are "old timers."

Message Forms

Good traffic men send messages in complete form; office of origin (the place where the message originates); date (date the message is filed); check (number of words in the text); addressee (name and address of party to whom the message is to be delivered); text (body of the message); and signature (name of party sending the message); these are always sent. In some cases date and check are omitted. Some of the messages of the "rubber stamp type"—("ur crd recd wl QSL ltr") which we talked about so much at conventions, don't need much more than an address. They are dropping off in big chunks and before long the gang will be back to regular traffic.

The Log

Don't forget to keep the log. What's a log? Why, it's a record book kept by all good operators to show exactly when everything happened at their stations. The left column is always used for the exact time. The Old Man is right up to date; he uses Official A.R.R.L. Log Sheets which are supplied to League Members at cost from Headquarters. To make it a bit easier T.O.M. uses two arbitrary characters; when he calls "CQ" he indicates it by placing an (X) right after the time he called and when he calls another station he indicates it by placing an (O) in the proper place. We don't find many (X's). (Arf! Some CQ hound is on.) No use waiting for him to sign. He calls "CQ" thirty or forty times at a crack without signing. He doesn't seem to know that he ought to sign once in a while. His traffic figure would be larger if he didn't "CQ" so much.

There's 1ZE! Give him a call. Call three times and sign three times like this "1ZE 1ZE 1ZE de T.O.M. T.O.M. T.O.M." If he doesn't answer the first time wait a minute or two and call again, but don't break your arm calling and don't spoil the air for others. When 1ZE answers, ask him if he

has anything going your way. Use the signal "QTC?". 1ZE is known as "Amateur Number One." He is a real old timer and he sends distinctly. We copy "T.O.M. T.O.M. T.O.M. de 1ZE 1ZE 1ZE GE OM QRK? QTC QRV? K." 1ZE says, "Good evening, old man, how do you receive my signals?; I have a message for you; are you ready to receive it?; go ahead." Tell 1ZE his signals are good and that you are ready for the message. "DR" sends: "1ZE de T.O.M. QRK QRV K." "DR" copies "T.O.M. de 1ZE Nr 1 fm Marion Mass. 1ZE to Mathes radio 7OE I have been working WNP nearly every night since he left Wiscasset sig 1ZE." The way to QSL (acknowledge) for that message is to send "1ZE de T.O.M. R nr 1 K," meaning that you have received message number one and (K) to go ahead with the next one. 1ZE has nothing more and "DR" copies "T.O.M. de 1ZE tks nm cul 73 gn," meaning "Thanks; nothing more; see you later; best wishes; good night."

Relaying

We have the message and we must relay it along. First we all locate 7OE by referring to the call book. We find Bremerton, Washington, is the place. Not

-MORE FUNNY CALLS- BY BOX-		
1BAG <small>F.I. STAFFORD HARTFORD CONN. HIS CALL REMINES U.S. OF SANTA CLAUDE</small>	2COP <small>E.L. BROWN LONG BEACH N.J. HIS CALL SOUNDS LIKE A PAIR OF POLICEMEN</small>	3ACE <small>C.P. KOON PORTSMOUTH VA. HIS HOLDS A GOOD NAME</small>
4DX <small>THE STATION OF J.B. SWICART, JR. GREENVILLE, S.C. MUST BE FOR DX</small>	5ER <small>J.E. CHAIN, JR. NASHVILLE TENN. HAS A IN A "TENN"</small>	6DR <small>S.E. ROBINSON GREENSBORO CALIF. SOUNDS LIKE A SICK DOCTOR</small>
7HE <small>THE BIRMINGHAM AMATEUR CLUB BIRMINGHAM ALAB. MUST HAVE GIVEN "HE" OPERATOR</small>	8IB <small>C.A. MENNIE DETROIT MICH. HIS CALL SOUNDS LIKE EIGHT POUNDS</small>	9BAR <small>R.D. M'COMBS THE BOXER IOWA IS OUT OF DATE</small>

familiar with our geography we get out a map and find that the message must go northwest from us. It pays to know the location of stations and we keep an ear out for some 9 in the line of travel.

8IB comes in. Well, let's see where 8IB is. The call-book says Columbus, Ohio, and that is northeast of here and out of line. Higgy operates 8IB. Don't you remember his old gag "I used to be a six DM but now an eight I be?"

9ZN nearly breaks the diaphragms. "WO" is operating, you can tell by his nervous snappy sending. He sends like he talks when he is in a hurry.

9AMB roars in. Give 9AMB a call. If you can raise him he'll put that message up in the 7th before an hour rolls by. He

can work 7ZU, 7ZO, 7ZV, 7ZB, 7ZN, or 7BJ, all of which are good stations. 1MY, over in East Hartford, perks thru. 1MY has been in the game only about a year, yet he knows pretty well how to handle traffic. One month he clipped off 848 messages, doing most of his work in daylight. He used to be a BCL, and learned the code when "HP" (Maxim) of 1AW was sending code instruction. 1MY doesn't know there are concerts in the air since he learned the code. His wave is right smack on 200 meters, too. It used to be up around 240 but he didn't know it and he was mighty glad to get down on 200. He has the right spirit and will be one of our best hams in a short time. A few good conventions will do much to wise him up a bit. Oh, sure, we have all kinds of fun at amateur conventions. No, we don't bar the BCL, we like to have him with us—he usually learns something there. We have technical talks, traffic meetings, stunts and usually wind up with a rip-roaring banquet and speeches by Maxim, Warner, Kruse, and others from Headquarters when they can get away, in addition to our local League officials.

The Traffic Department

We have DM's (division managers), ADM's (assistant division managers), DS's (district superintendents), CM's (city managers), and ORS's (official relay stations). A list of the DM's and ADM's appear in every issue of QST for the benefit of those stations who want appointments. The A.R.R.L. divides the country up into divisions. Each division is in charge of a DM. Each state is in charge of an ADM; each state is divided into districts in charge of a DS. In cities of 25,000 or over we have CM's. The real work is done by the ORS's. Each ORS keeps count of the number of messages handled each month and makes a report to his DS or CM who reports to the DM thru the ADM. The DM sends his report to the TM (traffic manager) who usually blue-pencils about 95% of the reports; the result appears in QST.

Say, you had better try 9AMB before he gets QRW (busy). Call him in the usual way and when he answers tell him you have a message—remember how 1ZE did it. Hold on a minute, let "PF" send the message, he hasn't tried it. Now don't get all excited just because you never handled a message; there is nothing to it. I know how it feels, I helped Adams, our advertising manager, with his first message. He got so excited he trembled all over and darn near swallowed his cigarette after having stuck the wrong end in his mouth three times.

Take it easy, use your head, and send distinctly even tho you can't send fast. "PF" calls 9AMB and then copies: "T.O.M. T.O.M. T.O.M. de 9AMB 9AMB 9AMB r

QRK bt QRM QRV K." That means 9AMB hears you OK but has a little QRM (interference from other stations) but he wants you to go ahead. "PF" sends the message and 9AMB comes back with "T.O.M. de 9AMB QRM rpt have been ? ? nearly every K." He means that he had a little QRM and wants you to repeat the words between *been* and *nearly*. To give him what he wants repeat the last word he received OK and continue thru the first word after the question marks.

Well, that's all there is to handling traffic. It makes no difference whether it is one or one hundred messages, the same form holds in every case. You'll fall in line with the others so fast you won't realize it, but if you want a few "do's" and "don'ts" I'll write them down for you.

What To Do

Listen in for ten minutes or so while you are sorting your messages, to get a line on what stations are working, before you use your transmitter.

Use abbreviations whenever you can save time by doing so. 2OM is one of our good "abbreviators."

QRX when asked to do so by another station who has difficulty in working thru you. It's an act of courtesy.

Report your messages and activity to your DS or CM every month on time.

What Not To Do

Don't CQ unless you must do something to pass away the time, but if you must, use a little judgment and sign your call at least once for every three CQ's.

Don't get sassy over the air—it's a cowardly act and almost as bad as telling a man what you think of him over the phone when you know he could make you eat dust if you talked that way to his face.

Don't QSL for a message when you haven't got it completely.

Don't say QRN or QRM when you mean QRS.

Don't tell a man his signals are very QSA or even QSA when they are just barely audible in the phones.

"LQ" gave me the dope on the SWM and she is perking like Sam Hill. Ask some of the fellows I have sent letters to telling them what their wave is; dunno what the outcome will be. May get a lot of kicks for telling those whose wave length is above 200 meters. Then I'll have to write another one of these things telling the gang how they *think* they are fooling the radio inspector but they are *really* fooling themselves by operating a transmitter with a wave length above 200 meters. Won't be long before some stations will have as much use for a license as a cat has for sidepockets—unless they get down to 200 meters or below.

EDITORIALS

de AMERICAN RADIO RELAY LEAGUE



The Convention

HURRAY, Gang! Break out the A.R.R.L. pennant to the breeze! We're going to have another national convention! Once more we hams from all over North America are going to have a chance to assemble in a four-day riot of amateur fun and hamfests.

The story is told in the leading article of this issue. It comes as a surprise to many of you because there has been no previous announcement, but when it was decided upon it had to come along in a hurry, before the school year started, and there was no time to make advance notices. Chicago is the place, September 11th to 15th the dates, and the Chicago Radio Traffic Association (affiliated) the bunch who are doing the hard work.

Any fellow who attended the First National A.R.R.L. Convention can tell you what a *real* affair it was, what a peach of a place Chicago is for a convention, and how well the Chicago crowd can plan and put over a big ham meeting. The last one was two years ago and in the meanwhile Amateur Radio has advanced immensely, we've come to know each other better, and we've got ideas now for a convention that will most fittingly usher in the opening of the active 1923-1924 relay season. This convention is going to be *different*. Drawing on the experience of several years of amateur conventions, the boring features of former affairs are left out and the enjoyable things expanded. The banquet comes on the first night instead of the last, so everybody can get acquainted and know his fellows during the rest of the time. The dry business meetings are *ausgespielt*, nix, nil—there aren't any. The technical meetings are two in number, and the speakers will be authorities who not only know things we want to know but who will be able to tell entertainingly about them and not take too long to do it. And because the chief business that goes on at such a convention is rag-chewing with the long-lost friend, the mornings of the convention are *blank*! Chew the fat all night and sleep all morning without missing anything—oh boy! The Chicago lads have the idea art. And then there's this "Night-of-Mystery" thing. To tell you the truth, we can't find out

much about it; just enough to convince us that if we missed all the rest of the sessions we'd be there for the final night or lose our oxide coating trying.

Need we say anything more? Come on and meet the bunch, in four days of sheer Amateur Heaven. And, say—bring your gang with you!

The New Regs

FIVE weeks under the new amateur regulations have passed as we write these lines. Most of the time has been consumed in recalling station licenses and endorsing them to extend the wave-length band and specify the quiet hours, but enough reports have been received to indicate the attitude of mind with which the regulations are accepted by the fellows. The reports of the Division Managers show clearly that they are acceptable, that Amateur Radio generally is keen for them.

The compulsory quiet hours have been accepted almost without comment, in the realization that they strengthen the position of the amateur immensely. This viewpoint is borne out in a letter we have received from the Bureau of Navigation, reading in part as follows:

"The Bureau expects the amateurs to conscientiously adhere to these regulations . . . and when complaints are received from broadcasting listeners that they are experiencing interference from code stations which they believe to be amateurs they will be required to furnish the name and address or the radio call letters of the station causing the disturbance. . . . Where complaint is made that amateurs are causing interference after 10:30 P.M. local standard time, the parties making such complaints will be informed that the amateurs are required to observe a silent period of two and one-half hours each day to permit uninterrupted reception of the broadcasting service so far as the amateurs are concerned and that as the amateurs are rapidly replacing their spark sets with tube transmitters and many of them using C.W. it is believed that they are contributing their share in the matter of giving relief from interference."

(Concluded on page 53)

The Operating Department

F. H. SCHNELL, Traffic Manager
1045 Main St., Hartford, Conn.



As this is being written elections for new Division Managers are being held in the North-western and East Gulf Divisions. Both men, Bliss and Cochran, resigned because of lack of time to carry on League work. New managers will be announced next month.

Several appointments were issued during the month to stations which will broadcast weekly along with those which appeared in the last issue of QST. The additional Official A.R.R.L. Broadcasting stations are: 2CFE, 3HH, 5VA, 5XB, 5AE, 5UO, 5UL, 5BDA, 9UH, 9DNC, 9APW, 9DKQ, and 9AAW. 9ADG appeared in error. This should be 9AOG. Cancellations of Official A.R.R.L. Broadcasting Stations are: 4BC, 9DGV and 9AIG. Official A.R.R.L. Broadcasting Stations broadcast

H. M. McCormick 9BJT
Streator, Illinois
Central Division
1130 messages

BRASS POUNDERS' LEAGUE

Call	Mgs.
9BJT	1130
1CPN	1129
8FT	491
9DLT	419
8AMP	406

Message Traffic Report By Divisions JULY

Division	C.W.		SPARK		TOTAL	
	Stns.	Mgs.	Stns.	Mgs.	Stns.	Mgs.
Atlantic	44	1714	—	—	44	1714
Central	94	7644	14	569	108	8213
Dakota	35	1207	1	18	36	1225
Delta	9	268	1	20	10	288
East Gulf	29	1019	2	15	31	1034
Hawaiian	5	65	—	—	5	65
Midwest	36	2183	4	87	40	2270
New England	54	3942	—	—	54	3942
Northwestern	36	1236	1	7	37	1243
Ontario	4	50	—	—	4	50
Roanoke	27	1251	—	—	27	1251
Rocky Mountain	12	418	—	—	12	418
West Gulf	59	3330	8	503	67	3833
Total	444	24327	31	1219	475	25546

Total C.W. Messages 24327—95%

“ Spark “ 1219—5%

official messages from A.R.R.L. Headquarters every Saturday and Sunday night at 10:30 standard time.

October issue of QST will contain the complete list of the entire Operating Department as far as possible. Following this issue, each month there will appear additional appointments or cancellations. This will give every member a chance to keep an up-to-date list of Operating Department Personnel.

There is a fair possibility of a meeting of all Division Managers at the Second National A.R.R.L. Convention in Chicago. This will be the one chance to meet your D.M. face to face and he is going to listen to your suggestions, so if you have any bring them along with you. We are going to get together and discuss our many problems involved in amateur radio.

The race for national honors was pretty close last month. 1CPN fell short by two messages of copping the prize. Better luck next time, O.M.

TRAFFIC REPORTS FROM A.R.R.L. OFFICIAL RELAY STATIONS

EAST GULF DIVISION—C.W.: 4DX, 172; 4PV, 135; 5AGJ, 105; 5AJP, 100; 5ABT, 42; 5CP, 32; 5UP, 10; 5AMH, 5; 4GL, 80; 4FS, 73; 4EB, 66; 4KU, 40; 4DO, 20; 4DT, 18; 4HW, 17; 4HS, 15; 4CG, 12; 4DN, 12; 4HZ, 12; 4EQ, 8; 4NA, 7; 4DF, 6; 4ME, 6; 4AZ, 5; 4CY, 5; 4FJ, 5; 4QF, 5; 4MB, 4; 4PL, 2. Spark: 4HS, 10; 4IO, 6.

ROANOKE DIVISION—C.W.: Virginia: 3ATB, 118; 3BUY, 95; 3CEL, 89; 3EVL, 77; 3BMN, 58; 3APR, 55; 3IW, 46; 3SG, 45; 3CBZ, 28; 3BHL, 18; 3CA, 18; 3TJ, 12; 3ABS, 6; 3AEV, 2. North Carolina: 3BZ, 6; 4EA, 22; 4BX, 60; 4FT, 147; 4AF, 19; 4MI, 88. West Virginia: 8ZW, 79; 8AQV, 50; 8AMD, 19; 8CQH, 31; 8CKM, 27; 8ATP, 56; 8AIP, 29.

HAWAIIAN DIVISION—C.W.: 6ASR, 15; 6BPR, 12; 6CCR, 1; 6CEU, 22; 6TQ, 15.

MIDWEST DIVISION—C.W.: Iowa: 9CWF, 15; 9UL, 10; 9BIK, 176; 9BGT, 92; 9HK, 92; 9DSL, 85; 9BHC, 112; 9BCD, 45; 9FK, 35; 9DJA, 6; 9CS, 2; 9ARZ, 56. Kansas: 9CCS, 100; 9ABV, 40; 9AIM, 55; 9DUG, 17. Missouri: 9NU, 140; 9DXN, 50; 9EKF, 21; 9BLG, 8; 9BHI, 33; 9AAU, 53; 9EKY, 73; 9PW, 2; 9AAL, 68; 9CGN, 13; 9DLT, 419; 9CTG, 20; 9ANO, 19; 9EFB, 85; 9DZY, 13; 9DCW, 43; 9ALX, 5; 9CKE, 180. Spark: Iowa: 9EFH, 47. Kansas: 9EFA, 36. Missouri: 9DAE, 3; 9COU, 1.

DELTA DIVISION—C.W.: 5ZB, 30; 5FV, 48; 5AAB, 18; 5KC, 116; 5NZ, 28; 5EK, 6; 5TX, 10; 5AGG, 6; 5YE, 6. Spark: 5BW, 20.

ROCKY MOUNTAIN DIVISION—C.W.: Colorado: 9AMB, 153; 9BVO, 16; 9BXA, 9; 9CAA, 107; 9CFY, 32; 9EEA, 10; 9COE, 18; 9EAE, 10; 9DFH, 20; 9AUW, 18. Wyoming: 7DH, 24; 7ZV, 10.

DAKOTA DIVISION—C.W.: Minnesota: 9BMR, 188; 9BAF, 77; 9CDV, 21; 9GW, 17; 9DDP, 22; 9EGG, 21; 9QF, 6; 9MF, 37; 9DMA, 14; 9EIQ, 8; 9ZT, 106; 9EBG, 88; 9DAW, 44; 9BFI, 40; 9BKJ, 35; 9CIP, 30; 9APE, 24; 9BTL, 21; 9APW, 20; 9DHP, 20; 9CTO, 14; 9CVV, 12; 9DGE, 8; 9AUL, 5. North Dakota: 9UH, 28; 9AHC, 20; 9EBT, 20; 9AEJ, 2; 9BZF, 32. South Dakota: 9YAK, 102; 9AYL, 43; 9BRI, 18; 9CJS, 17; 9CGA, 38; 9AVZ, 9. Spark: 9BOF, 18.

WEST GULF DIVISION—C.W.: Northern Texas: 5MN, 267; 5AIF, 263; 5KO, 106; 5AHT, 94; 5TL, 86; 5QI, 7; 5DL, 1; 5CT, 21; 5AJJ, 92; 5HY, 150; 5IX, 171; 5ZH, 3; 5ALL, 10; 5LL, 101; 5ACQ, 20; 5NW, 55; 5NY, 50; 5FA, 94; 5XAJ, 43; 5UY, 6; 5AFH, 17; 5AHC, 72; 5FC, 27; 5NS, 95; 5AER, 32. Oklahoma: 5KE, 51; 5KW, 35; 5ZM, 43; 5ANC, 58; 5GJ, 94; 5GA, 28; 5XBF, 12; 5AHD, 44. Southern Texas: 5JM, 22; 5OC, 10; 5ZX, 5; 5BA, 57; 5NN, 45; 5VY, 45; 5RA, 70; 5ALK, 42; 5KG, 7; 5AEW, 6; 5VO, 61; 5MT, 33; 5JC, 23; 5GE, 45; 5JF, 25; 5ADI, 1; 5SS, 41. New Mexico: 5ADO, 8; 5LG, 1. Mexico: 5BX, 36. Spark: 5CT, 64; 5AIC, 25; 5ACQ, 49; 5AJT, 18; 5UD, 282; 5OI, 5; 5FP, 5; 5JH, 50.

NORTHWESTERN DIVISION—C.W.: 7ABS, 154; 7GP, 147; 7WS, 100; 7BJ, 86; 7AGE, 72; 7IW, 75; 7LY, 65; 7ADM, 57; 7JS, 56; 7LR, 52; 7TT, 37; 7LN, 34; 7ADP, 31; 7AGV, 28; 7AIY, 28; 7TQ, 27; 7AHL, 20; 7IO, 18; 7HA, 17; 7UT, 17; 7ADQ, 15; 7GE, 19; 7TO, 11; 7CA, 10; 7NS, 10; 7DC, 10; 7FD, 9; 7ACY, 4; 7UU, 4; 7ADS, 4; 7WM, 3; 7AKG, 3; 7GO, 2; 7BA, 1; 7WX, 1; 7ZN, 1. Spark: 7BG, 7.

NEW ENGLAND DIVISION—C.W.: 1BBM, 20; 1GV, 25; 1BES, 38; 1CAB, 15; 1AWV, 9; 1OW, 20; 1IL, 105; 1CSW, 37; 1CDM, 40; 1BVB, 112; 1AML, 31; 1BQD, 12; 1BAS, 10; 1KX, 50; 1FM, 18; 1BAC, 65; 1BAS, 10; 1KC, 130; 1BVR, 128; 1CGR, 52; 1IL, 38; 1BSJ, 28; 1ARE, 13; 1BLN, 1; 1BDU, 36; 1ABY, 7; 1ADN, 171; 1AJJ, 5; 1AKZ, 38; 1AOU, 6; 1AQM, 48; 1ASK, 7; 1ASU, 48; 1BLX, 62; 1BQK, 10; 1CNA, 17; 1CPD, 137; 1CPN, 1129; 1CUP, 15; 1DB, 48; 1GY, 36; 1JV, 268; 1KW, 31; 1PM, 15; 1COT, 72; 1AGS, 75; 1AAC, 108; 1FD, 56; 1CPO, 98; 1AIQ, 6; 1LK, 108; 1SK, 157; 1CDO, 46.

CENTRAL DIVISION—C.W.: Chicago: 9US, 135; 9AOY, 47; 9EBK, 31; 9EDD, 11; 9DMF, 8. Illinois: 9BJT, 1130; 9CZL, 387; 9AIC, 292; 9DQU, 247; 9EAC, 145; 9AWQ, 136; 9AHQ, 129; 9BWA, 66; 9MC, 87; 9DBP, 62; 9DCR, 40; 9AUS, 58; 9BZQ, 42; 9CCN, 37; 9COX, 34; 9DLR, 32; 9AYX, 30; 9DJG, 32; 9ABE, 24; 9CLZ, 18; 9CXT, 15; 9BDW, 15; 9CFK, 14; 9CGU, 14; 9DXL, 11; 9CMC, 10; 9BAW, 5; 9CKE, 5; 9BYX, 2; 9BXD, 2. North. Ind. 9DXX, 46. Southern Indiana: 9DIS, 80; 9UR, 60; 9EAD, 56. Ohio: 8FT, 491; 8AMP, 405; 8BYN, 292; 8WY, 201; 8CWR, 190; 8CKV, 161; 8IJ, 156; 8CNL, 137; 8CVG, 128; 8GV, 125; 8CNR, 109; 8ADA, 91; 8CDK, 63; 8AWN, 57; 8ZV, 53; 8BSI, 48; 8AER, 45; 8TJ, 40; 8BFH, 37; 8CWP, 35; 8RY, 25; 8ABE, 22; 8FU, 20; 8AHY, 19; 8NR, 19; 8BHO, 15; 8AL, 16; 8BBH, 14; 8AWX, 9. Wisconsin: 9DLY, 76; 9ARC, 59; 9DHG, 43; 9DCT, 41; 9CZY, 36; 9DRO, 31; 9CJL, 15; 9BVA, 15; 9BCH, 13; 9BYE, 15. Michigan: 8CED, 77; 8DKC, 76; 8ZZ, 63; 8JJ, 50; 8BDR, 53; 8AND, 43; 8AAB, 42; 8BZD, 38; 8BBJ, 36; 8DI, 32; 8ZF, 32; 8BXA, 28;

8CDD, 25; 8CJK, 21; 8AHO, 20; 8BDO, 19. Spark: Illinois: 9CA, 57; 9VV, 9. Chicago: 9AAW, 307; 9DWX, 31; 9DMY, 20; 9CFP, 18; 9BEF, 15; 9AOY, 12; 9EDH, 9; 9DIL, 12. Ohio: 8TJ, 40; 8BCO, 20; 8BBY, 2. Wisconsin: 9BQG, 17.

ATLANTIC DIVISION—C.W.: Pennsylvania: 8AKI, 8; 8CNW, 12; 8CEO, 11; 8QD, 18; 8VN, 5; 8BW, 21; 8AGO, 76; 8CKO, 111; 8AIG, 32; 8SF, 4; 8ZD, 20; 8BIL, 20; 8BJV, 54; 8AYZ, 10; 8BDL, 20; 8HD, 19; 8FS, 16; 8BOU, 13; 8CCX, 53; 8BBV, 20; 8CCU, 93; 8ZO, 123; 8QT, 30; 8CHG, 90; 8BNU, 278; 8CDN, 17; 8AYL, 9; 8LK, 46; 8CTZ, 5; 8AVM, 22; 8ADP, 10; 8ADQ, 13; 8ZM, 6; 8AWH, 54; 8GC, 5; 8AWV, 40; 8ZS, 25. Delaware: 8AIS, 5. Dist. of Col.: 3JJ, 134; 3AB, 95; 3IL, 21; 3KM, 9; 3BSB, 9; 3BWT, 17.

ONTARIO DIVISION—C.W.: 3DE, 5; 3CO, 5; 3ZS, 20; 3PH, 20.

ATLANTIC DIVISION

C. H. Stewart, Mgr.

3AUN has his station now operating on 15 watts with 1.7 amps. radiation. 3BSB has grounded his antenna until fall when he will be on the air again with renewed vim. 300, another prospective station of 15 watts, was on the air last week. Efforts will be made to get him on regularly. 3AFN will try his best to make one or two evenings per week at the key. His set has not been in operation since last February.

Deichman, A.D.M. of Maryland, being at this time on a short trip out of town has been unable to report, but a little information has been obtained by the writer relative to Maryland activities. 3APT seems to keep Baltimore open continuously with schedules, one in particular with 3JJ. He reports 107 messages and the opening of a new station, 3BU, owned by G. A. Peters, Jr. His station will operate with 15 watts and at this writing has already shown ability to reach out. We hope to have a nice report from this station by next month. 3PH also has been on the air and reported FB in Washington and the west. 3WF reports 234 messages, a good total for the summer months. Miller is to be congratulated and must keep up the good work. No other stations having made reports it is unlikely any other work has been done out of Baltimore. Rumor has it that there are a few good stations in Hyattsville working and these stations should make reports to their A.D.M. Stations in any other part of the state, likewise. We must have a better showing for Maryland in the future.

Wadsworth A.D.M. deserves more credit than this report shows for the District of Columbia. 3JJ is the most consistent station in the District being constantly in operation from 10:30 P.M. till sometimes many hours after midnight. His motto seems to be "Never let the rectifier cool" and his regular schedules are with 3ZO, 3APT, and I believe a new one has been arranged with old 4GL who has "come back" after nearly a year's silence. Hot weather seems to have hit 3SU, but he promises to come back next fall. Among the faithful and in the running with 3JJ are 3AB, 3BWT, and 3IL. 3OD and 3KM are on occasionally; also 3BSB. With cooler weather in view many of the absent will be on the air again. 285 messages have been handled.

Rau of Eastern Penna. makes a very nice report for this time and reports traffic news by district as follows. Dist. No. 1: 3AWA and 3AWH have combined for the summer and continue to QSR thru terrible static. 3GC, 3ZM, and 3AWF are earnest cooperators for this district. Dist. No. 2: 3BNU is sure burning midnight oil with a new 50 watt and has handled the bulk of the traffic for this district. 8AVL, 3AVM and 8CTZ are shaping up for the coming winter. 3LK had tube trouble but turned in a good report. Easton is reported dead. Dist. No. 3: No reports from D.S. Five months have passed and nothing heard. Scranton reports Electric City Radio Club has adjourned activities for the summer. 8BIQ is off until September. Dist. No. 4: 8ZO reports a decrease in traffic due to change in wave to

175 meters. 8QST and 8CHG make their initial reports this month and we hope they continue throughout the coming season. No report from Reading. Most stations on vacations. Dist. No. 5: Unless Lancaster reports are forwarded it will be necessary to make a change in City Manager. 8CCU is a very consistent worker for this district. 8BRF is on again with new tubes. Harrisburg is strong for C.W. with 8CCX and 8BBV working their 50-wattors hard. 8ADE helping out with 10 watts. Dist. No. 6: All stations in this district are closed for the summer. Several are rebuilding for the winter. Philadelphia: Most all stations are away for the summer. A big boom is expected for Phila. with many new stations opening up soon.



8CMC of CANANDAIGUA, N.Y. IS AN UNDERTAKER -- NUF SED !!

Western Penna.—Traffic in general throughout this section has fallen off considerably during the past period. This is not due, however, to any slackening down of the operating stations but more to the fact that a lot of stations are being completely remodelled. We are also doing other things in this section which are as valuable as handling message traffic. We are promoting real honest-to-goodness amateur cooperation by means of radio hamfests. Some time ago hamfests were started in the 9th Pa. Dist. and have continued by meeting every two weeks at a different station. During the last two months, while many stations are out of commission on account of reconstruction, these hamfests have been the very best thing for bringing the gang all together and getting them better acquainted. At the last two or three meetings we have had the visiting amateurs from towns 50 to 75 miles away and when they come that far it sure must mean there are real amateur things going on. Almost everybody agrees that the hamfests have adequately filled the gap made in our local communication by broadcasting quiet hours. The spirit of hamfesting is spreading and only last week the 14th Pa. Dist. held a meeting at Uniontown, Pa. This hamfest was attended by 14 members of the 14th Dist and 10 members of the 9th Pa. Dist. who had to travel 120 miles round trip. This gang returned to Pgh. at 5:30 in the morning. How's this for the real old amateur spirit? 7th District: No report. 8th District: This district is being worked over by 8AKI who has been appointed temporary Dist. Supt. He reports that there are great possibilities within the District but that it will take a little while to get things going along so there is no definite message report for this period. 9th District: 8CKM will not be in operation until the last of August. 8QD, a new station, is located at Scottsdale, Pa. and is on from 5:30 to 7:30 P.M. E.S.T. for traffic east and west. One 5-watter uses 650 volts A.C. for C.W. and 350 D.C. for fone and local work. 8QD has been reported QSA several times in IOWA. 8BW reports nobody on during daylight and very bad QRN at night. In spite of this some traffic was handled OK. 8LL is overhauling both his transmitter and receiver and will be ready for traffic by next month. 8VN still

uses 4 5-wattors but has collected essentials for a 100-watt set including a good 1000-volt M.G. set and a good filter. 8AGQ reports the station closed until Sept. 8CEO, McCauley, reports that five ops. are starting to construct a good 250-watt station for the winter. The present station finds it hard to work west lately but north and east is FB. The Oakmont "gang" is showing lots of pep lately. 10th District: No report. 11th District: District Supt. Swanson reports that 8BIL was the only station handling any messages. Stations 8CLI, 8AXD, 8BLT, 8CON have not handled any traffic and have decided to reconstruct their stations in order that they may do better work this coming fall. Conditions are very promising for a traffic organization in this district but, of course, it will require working up. 12th District: Supt. Lloyd reports that all stations must be off duty for hardly any reports at all were received. 8QC is preparing to take a small C.W. set to Mt. Gretna during the Pa. National Guard encampment. The call letters at the camp will be 8HL and N65. A 1-K.W. spark set was used last year at camp but it is expected that the C.W. will do much better this year. 13th District: No report. 14th District: 8AYZ, due to local QRM, has been having trouble getting out but expects to do better later. 8DBL, our new station in Berlin, Pa., is doing fine, but owing to antenna trouble has had some difficulty getting out. He is arranging some schedules now and is expected to do some good work. 8BDU blew up his 1/4 K.W. Jug and was up against it to handle traffic. A new Jug is now in place and Lynn hopes it will hold up better. 8BJV did some good traffic work to the 9th Dist. last month which, in spite of QRN, went through fine.

Report of City Managers: F. B. Westervelt, the newly appointed City Manager for Pittsburgh has been away for the past thirty days attending the Officers' Training Camp at Camp Meade. Although traffic has slowed down considerably in Pgh. the following reports have been received by the A.D.M. A total of 76 messages was handled by 8AGO during the period without any great effort. Station 8AGO is one of the most reliable official relay stations in this district. 8CKO is another good Pgh. station using 50 watts C.W., phone, or buzzer. This station handled 111 messages in addition to 29 messages that were of the "thanks for card" type. 8CKO is desirous of operating his station every night and would be glad to hear from any operator that would like to assist in operating the station. 8AIG, operating only a small portion of the period, handled 33. The mast and aerial at 8AIG were blown down in a recent storm and in addition motor generator troubles have developed necessitating a thorough going-over of the entire station. Here's hoping the station will not be off the air very long for we are sure 8AIG can handle a good deal of traffic through his section of Pgh. 8ZD has been doing very little on account of the absence of operator "WX" and the activities of "MO" being confined mostly to construction. However, a total of 20 messages was handled during four or five nights of operation. The following stations all reported that no traffic was handled due to a hundred and one different troubles that have developed in their equipment. 8CVX, 8CFB, 8BTU, 8CEJ, 8BT. 8EW has joined forces with 8AU (old 8LX) and will be on during the next period with both C.W. and spark. (Fine business, OM, we'll be glad to hear you on again.—A.D.M.) 8SF had trouble with his generator and is now experimenting with rectified A.C. Very little traffic is being handled as the present set does not seem to get out well. Only four messages were handled during the period.

Report for Altoona was made by Aughenbaugh who is acting both as Dist. Supt. of the 8th and as City Manager for Altoona.

No report from Erie.

8BYI, who is acting as City Manager for Johnstown, reports that conditions look favorable for his city during the next period. 8CBH with a good 10-watt C.W. and phone set expects to handle his share of the traffic during the coming season. 8BMP is operated by James M. Alter, who operates during the winter at 8XE, State College, Pa.

8OP is a 5-watt A.C. C.W. but has been inactive of late and will require a little encouragement from the City Manager to get things started again. 8BYL, operated by the City Mgr., is at present being remodelled somewhat but manages to QSR traffic on schedule with 8DBL, 8AYZ, and 3IW.

No report from McKeesport.

No stations operating in New Castle are known to the A.D.M. so therefore no appointment has been made of City Manager. The A.D.M. would be pleased to hear from anyone who is interested in amateur traffic in this city.

CENTRAL DIVISION

R. H. G. Mathews, Mgr.

OHIO—Dist. No. 1: Most of the stations are out of commission for the summer. A new 100-watt transmitter is being installed at 8AA. Dist. No. 2: 8AMP is the star of the district this month. 8YAE will be off the air until September owing to rearranging his station. 8BXX is off the air but will be back soon. 8BFH and 8LT are on the air with 50 watts apiece. Dist. No. 3: 8WY and 8CDK turned in good totals. 8RY is working well into the southern states with his 10 watts. 8ADA has substituted a 5-watt for his 50 which passed out and with .4 amp. gets out into Nebraska in fine shape. 8BBY reports little success with the spark this month because of static. Dist. No. 4: This district now operating on new wave length schedule, and from all reports received much better work is being done. This district leads the state this month, with the best message total. 8FT is not only the highest station in the district, but also has the greatest message total for the entire state. Dist. No. 5: 8TJ has had hard luck with a storm which tore the shack open, scattered cards all over the county, put both sets out of commission for 5 days, but failed to touch the two 80 ft. poles. 8GZ has only been on a few days because of tube trouble. He relays no more "rubber stamp" messages. 8BYN is closed for the summer. 8BBH and 8AER were on the job very little but promise to do better in the fall. Dist. No. 6: 8ZV is contemplating increasing his present 250-watt transmitter to 500 watts. This station established regular watch June 1st with four operators. 8ABE is now in operation with 5 watts D.C.

WISCONSIN—Dist. No. 5 is just getting a new lease on life with the advent of H. Jones, the newly appointed D.S. Dist. No. 3: The cooperation extended by relay stations in this district, even in the hot weather, is appreciated. Nearly every station reports. Judging from traffic today; winter will see some "helrazed" in this district. Many new stations are budding out and many others are ready to handle traffic. Quite a number of these stations will be classed as O.R.S. and will receive "diplomas." 9BMU reaches out well. 9DLY's first report is 76, some business considering weather. 9BCH is going west where he can hear the sixes. The following stations have improved: 9DCT, 9BHQ, 100 watts now. 9DRO, 150 watts. 9DHG, 100 watts. 9BCH, 100 watts, and 9BYE, 10 watts.

SOUTHERN INDIANA—Dist. No. 5: Indianapolis is the only town that is standing the heat and QRN. 9BVZ and 9BJR are out on account of generator or rectifier trouble, and 9BCT is changing location. 9EAD and 9NR are handling the most of the traffic. 9DXE has a ship job for the summer. Dist. No. 3: 9DIS, 9DYU, and 9BRK are the only active stations. 9DYU hasn't blown any tubes lately, but is still having generator trouble. 9DWM has blown all his 50's and is erecting a new aerial and counterpoise.

MICHIGAN—Dist. No. 1: The following stations have been fairly consistent during noon hours, generally 12 to 1 or to 1:30. 8DAT, 8CJK, 8CDD, 8BDR, 8DBO, and 8CAZ, and 8BGJ on about 1:30. 8AND holds regular noon schedule with 8DAT, 8CJK, 8BGJ, 8CDD (when possible for him to be on) connects with 8BDR for tfe. and 8CAZ is now about QRV for 8AND at noons. 8AHO QRV most each evening for traffic into Flint, generally from 5:30 to 8:00. 8AHO, 8AND are on each nite

also, one generally always QRV. There seems to be enough stations operating daylight to keep traffic moving in all directions. Four test messages sent out from the superintendent's office failed to reach destination when station was in same town as msg. was routed for. No prefix on these messages told they were test so stations receiving same seemed to use regular procedure of delivering. 8AMS is on now with C.W. Worked six months to get 'er going then in 45 minutes one day found he could get 1½ amp. Reports are that he sat down and never left the key for 18½ solid hours. FB; route half way to north, now for the other jump to the straits. 8AMS is on noons and evening. Dist. No. 2: 8BGL and 8BYF have combined as one station and are on the job most of the time. The City Manager of Battle Creek reports that a number of new stations will be ready for business early this fall. 8YN is closed for the summer. 8JJ has his ¼-K.W. tube in operation and is able to work about anywhere he pleases. 8CED is continuing



9LZ, CHICAGO, ILL. IS A STREET CAR MOTORMAN

to kick out some remarkable distances with his 5-watt set. 8DFB is a new station at Lansing, operated by one of the Ohio gang. It is a 5-watter at present. 8ZF has recently installed a buzzer modulated set for local work using 195 meters. This overcomes the difficulty of copying the pure D.C. set which continues for DX work on 206 meters.

ILLINOIS—Dist. No. 1: 9VM is on again after rebuilding while 9BIZ and 9CHF are expected on soon, as is the case with 9DOB. 9AWU is a newcomer at Princeton. 9NQ is working on a C.W. with frequency changer to give 480 cycles on the plates. Peoria has a report from the new City Manager, 9BIJ. Overhauling seems to be the rage there with 9CTV, 9EIB, 9PQ, 9BLJ, and 9CTV all off the air for this reason. 9CTV reports working 1000 miles on June 10th, showing C.W. will cut through the QRN.

Dist. No. 2: 9BJT, the star station, should win the box this month unless someone else had the same idea. 9BJT has the old 250 going now but still he has the output of a 5-watter, but we can overlook a little thing like bum radiation caused by an aerial of the same caliber, when 9BJT handles 1130 messages through the worst kind of QRN. 9BJT deserves credit for working so consistently and doing his stuff for the A.R.R.L. District 2 is proud of the "Squirt." "Viva le Squirt!" 9DXL will be gone on a short vacation. 9AJZ is on in spurts but no traffic handling. 9AIC is doing excellent work on 20 watts and was in Chicago for a commercial license. 9AIC will be remembered by the old timers before the war as 9RA. 9DLO is on with I.C.W. and is doing very good work but has an inefficient receiver for Ham work. LaSalle: 9ABE is on his vacation as well as the AIR and swings a wicked fist as well as the OW. Miss 9ABE. The OM has a commercial license now. District 2 is floating with commercial ops. and will be a record breaker soon in message totals. Lockport: 9CCN is the only station in operation now and doesn't get much time other than morning. He sex that there are no stations on the air in the morning and that accounts for the small message total. Ottawa: 9BTA is in Chicago for the summer and the old

100-watter is idle, but he will be with us again this fall. Mendota: There is a lot of material in that town but it seems that there is only one station that reports and unless some reports are received some appointments are going to be jerked. That holds good for other towns also. Remember that little clause that states that reports are to be in the D.S.'s hands at a definite time each month and that you can't miss more than two in succession? That is going to be enforced in district 2. 9AHQ is the only one that reported this month and he is rather busy but nevertheless he handled 129. Dwight: 9CA is still waiting for the trial to come off and see Who's Whose. In the meantime he has taken the commercial exams. The old Sine Spark still reigns at 9CA altho C.W. will no doubt be in use this fall. Cabery: 9DDY has been knocked out again because of the failure of the power company to run juice into Cabery. Kempton: 9DYN brothers are busy as usual in the field but get on the air Sundays and Holidays. Pontiac: 9APB and 9CXL his sister, and 9PQ are back home again but no activity. Maybe if Henry Buland would get on the air it would help 9DDY get juice into Cabery. Dana: 9CCM will be on probably by the time this appears, as the Public Service Co. is ready to start work on the new high line which will give him juice.

Dist. No. 3: D.S. Cain reports lots of pep for fall but that nearly every station is being rebuilt this summer. 9MC is endeavoring to make some 250 watters give forth their allotted amount of energy.

Dist. No. 4: All the C.M.s reported loyally as did the D.S.s but hot weather overtook the message total. 9BAW says it's fine fishing weather. 9KX is overhauling and 9VV has a new job of Publicity Manager for Danville. Champaign-Urbana boys are all off the air except 9DCR.

Dist. No. 5: Everyone here seems to have the 50-watt tube set in mind for the new season as an idea and there will be several of that power going. C.M., 9MS, continues to report faithfully but activity is curtailed in his town. 9DMN has been experimenting and not doing much. 9AUS has been at it as usual. Reported from 37 states and the Caribbean Sea on one 5-watt bottle. 9DLR, 9AYK, and 9CKE complain of QRN and turn in slim reports.

DAKOTA DIVISION

N. H. Jensen, Mgr.

All indications point to greatly increased amateur activities in the near future. Many of the older stations are on the job all of the time and new stations are being added regularly. Keep up the good work of boosting for the League, Gang, and let's have a good representation at the Chicago Convention from this division!

MINNESOTA: Dist. No. 1: The traffic report for this month shows somewhat of a decrease in messages handled, but still gives evidence that there are a few faithful ones sticking to the job during the summer months. 9CDV is in communication with stations in both the Dakotas and with 9BAF, thus forming an effective summer route for traffic through 9BAF going west into the mountains. The stations in Duluth are practically inoperative.

Dist. No. 3: 9AUS has been out of commission for six weeks due to his aerial coming down and having to wait for new insulators. 9APW is experimenting with new receivers and for that reason has been on the air very little the past month. 9DGV has not pushed brass for two months. 9APW, 9CIP and 9DGV have all been reported in New Zealand. 9DGE was heard in Germany, he claims. 9BFL, a new five-watter, is starting to get out. 9ZT was heard in New Zealand and Australia, making eleven countries heard from, and 9AUL has also been heard in New Zealand and Australia, making thirteen countries heard from.

NORTH DAKOTA (The 100% C.W. State): This state has recently been divided into two districts, with Kenneth M. Hance of Fargo as Supt. of District 1, and Harold Demmer of Ellendale (9AHC) as Supt. of District 2. John A. Gargrave (9DLF) has been appointed City Manager of Aneta. Station 9UH, owned by L. H. Weeks

and Verner Lucas, is doing good work. Supt. Hance will soon have a new 10-watt station in operation. There is considerable activity at Aneta. 9AUU is on the job regularly with 20 watts. Other stations now active or which will soon be heard from are: 9DLL, 9DLF, 9AMP and 9DMT. 9AHC is holding its own during the hot weather, as is also 9EBT of Fargo. Keep up the pep, gang! You have a good organization now. Let's see some results.

SOUTH DAKOTA: Dist. No. 1. Well, what do you think of it, fellows—9YAK is with us again! Not with the old rock-crusher, that made the air vibrate for great distances and made "HF" feel as though he owned the world, but with 50 watts C.W. This station is at present being operated by Lloyd Olander. 9BOF continues good work with his spark. Harry Manning has returned from a month's vacation in the Twin Cities, and by the way, we are informed that the YL also returned. "HM" will now be back on the job at 9DKQ again. Daily communication is being carried on between 9DKQ and 9CKT handling news to and from the Y.M.C.A. Camp at Lake Madison.

Dist. No. 2. Good daylight work is carried on by 9AYI, 9CGA, 9BRI, and 9AVZ. 9AVZ has unpacked his UV204 again and expects to be in touch with WNP soon. He says he has a "real" plate supply now with filter, and a 110-foot antenna. 9DWN's pole went down during a recent storm. The first report from 9CJS of Bryant has been received this month.

DELTA DIVISION

W. W. Rodgers, Mgr.

Things are perking up and down here and we will have a fine machine working within a few months. The new officers have taken hold of the work and are whipping things around rapidly.

MISSISSIPPI: This state has been divided into two districts. S. D. Wooten, Jr., 5AGG, has been appointed Supt. of District 1, the northern section of the state. A.D.M. W. L. Kennon has not located a man for Supt. of District 2. Traffic has been light in Mississippi because of prevailing weather conditions. 5TX and 5AGG have been made O.R.S. 5YE has been very QRW with his A.D.M. work and we will have to pardon him for not handling over 6 messages.

ARKANSAS: Dr. L. M. Hunter, 5XAB, has been elected A.D.M. of this state and is working with the reorganization of his territory. 5ANJ sent in a most welcome report this month and gives us the "low down" on stations in his city. 5ACW gets to Long Island on 20 watts fone. 5ALN has 100 watts, but has very irregular hours as he is an undertaker. (Hi.) 5ANJ will have 10 watts of C.W. and fone going next month. In Conway, we find Woodruff of 5XAC pounding brass at WNU. He will be with us this fall. (Attaboy, XAC.—D.M.)

TENNESSEE: Here we are, gang, the 100% state! Tennessee's organization is nearly completed, altho many changes have been made in it during the last two months. The reports by district are:

Dist. No. 1. Alfred L. Cowles, 5NZ, has been appointed D.S. Memphis. 5NV has resigned as C.M. here and has been succeeded by Walker L. Wellford, 5ZB. 5NV says the YL's look good to him and he has quit us forever. (where have we heard that stuff before?—D.M.) 5EK is our only consistently-operated station. He uses 20 watts now; guess he is saving the 100-watter until winter. The BCLs bother 5NZ and he got away with only 28 messages. 5PV is with us again after swearing off for a whole month. 5PF is in a woeful condition because of female (domestic) QRM. He got rid of his 5-watter and tried to sell his side-swiper and the rectifier solution to the gang. 5MO raised his output 4 Amps, by installing a sink rectifier. He now gets 5 T.C. Amps and reaches both coasts. Pretty good work for this climate. 5BW is still with us on spark. 5RL-5ZBA is operating spasmodically but will be on soon with another transmitter. 5RZ is using 5 watts in a temporary location. He will be on regularly this winter with 150 or 200 watts. 5IK

has accumulated a bug key, talks dreamily of 500 cycle stuff—yes, he will be back again. Nashville: Meagre reports this month. 5FV and 5AAB are the only stations of note operating here. 5FV is on more regularly now and is trailed by 5AAB using 5 watts and getting 1200 miles. 5AAB is C.M. of Nashville.

Dist. No. 2: Mr. B. F. Painter, 5MB, has been appointed D.S. here but, as he is away at a training camp, we have no report from him. 5DA has been rebuilding all this month—result, no traffic.

EAST GULF DIVISION

B. W. Cochran, Mgr.

SOUTH CAROLINA stations carry off first and second honors this month in the number of messages handled. 4DX with 172 leads, and 4PV says he has strained his grid-leak in getting thru 135. (FB Keep up the good work—D.M.)

ALABAMA: In Birmingham only four stations reported: 5CF, 5AGJ, 5AMH, and 5UP, but they have accomplished more than has ever been done in summer before. In Montgomery, 5AJP with 15 watts is reported from the state of Washington and 5ABT with 10 watts has worked six districts, all in midsummer.

FLORIDA: 4FS is keeping Florida open for traffic and has little difficulty in working northern stations. 4HZ has handled some traffic. 4PI has been appointed C.M. of St. Augustine to succeed 4MT who resigned to go to college. All Tampa stations are closed for the summer. 4BC, the D.S., has resigned and moved to Chicago. 4DP has his 100-wattter going and is making a good start.

GEORGIA: Atlanta has a number of stations on the air. 4KU leads in traffic handled, with 4HS and 4DO pushing him close. 4CG, 4HW, 4FJ, and 4NA are regularly on the air. 4IO and 4HS on spark work right thru QRN. Other stations handling traffic are 4DN, 4EQ, 4DF, 4ME, 4AZ, 4QF, 4CY, and 4MB. 4GL is back on with 100 watts and working 'most anywhere. 4EL is rebuilding and 4BY is on but little. 4DT is working regularly and handling considerable traffic. 4YA will be on this fall with 1000 watts D.C. C.W.

In making my last report as Division Manager, I want to thank the men and personnel who have helped to keep the old East Gulf to the front and bespeak your hearty cooperation with the new Division Manager. Let us give him our best and make our division the liveliest and most efficient in the League.

HAWAIIAN DIVISION

K. A. Cantin, Mgr.

HONOLULU, Dist. "A." Considerable activity, due to the stations here getting QRV for the winter DX. 6CMH is blasting holes in the ether with his 100-wattter. 6CCR has a new 20-wattter in addition to his 10-watt set. 6ASR is kept QRW QSRing inter-island messages. C. J. Dow, 6ZAC fame is on the air again with D.C. C.W. Now for some new DX records. He signs 6BPR.

HILO, Dist. "B." 6AND is off the air for a short time and 6CEU is handling all traffic.

MIDWEST DIVISION

G. S. Turner, Mgr.

IOWA: 9BIK is getting out in great style, having been reported in Labrador by WNP. 9UL and 9CWF are going again. 9CWF contemplates a 50-watt tube set. 9EFH is one of the few heard using spark nowadays. Even 9CS, the old spark ham, has at last tried a C.W. set and worked 50 miles on fone. (Many will be glad to hear that you are on C.W. now, O.M. Keep it up.) 9HK has installed a 150-watt C.W. and fone. 9DSL and 9BHC are using ten watts. 9CBZ and 9ASI have now installed M.G. sets. 9ARZ has his new antenna and counterpoise system installed and they say it is a peach. 9BGT has been appointed C.M. of Davenport. Give him your active support, you Davenport hams. 9BCD and 9DJA are on the air again. 9FK has a 10-watt C.W. going in great

style now. (What about the 2nd National Convention, OMs? Let's be there, fellows.)

MISSOURI: 9DLT wins all honors for July. There was one station in Missouri this month that disregarded precedent to the extent that he handled traffic galore. 9DLT is this banner station. A total of 419 messages are chalked up to his credit. Very FB. Not much seems to be doing in St. Louis or Kansas City. A few of the gang are getting out in good shape, but not hearing much DX. One thing noticed this past month is that QSS is quite bad. The St. Joseph fellows are getting things in readiness for the coming season. To prove that they are in earnest they have purchased a \$65 wavemeter.

We are not forgetting what we said about resting on our laurels and about our promises to come back stronger than ever next season, are we, gang?

9BMN is now at Great Lakes in the Radio School. D.S. of Western Missouri is making an extended tour of the west and northwest. Both of these men are greatly missed as they have been helping out with our reports considerably.

9CKF, Marysville, Mo., for July (only 2 weeks) handled 180 messages on C.W. This will be his last report for some time as he is going east to school. 9DUX will operate 9CKF while Martin is away. (Show 'em how we do things down here in Missouri, OM, and also don't forget to come back home.)

KANSAS: 9CWC is new A.D.M. for Kansas. Cliff Himoe found it necessary to resign his position as A.D.M. last month on account of other duties. He is sorry to quit the job and I know we will all miss his good work.

An old timer, L. J. Simms (9CWC), 218 S. Sedgwick Ave., Wichita, Kansas, has been appointed to take 9AOG's place. Simms is a wide-awake fellow and can be relied upon to do the job justice. Come on, gang, drop him a note and let him know he has your whole-hearted support. 9CCZ has been appointed C.M. of Wichita in the place of Simms. 9CWC, 9CCZ and 9AMI were appointed O.R.S.. Both of these stations are abiding by the new regulations and are worthy of the honor. You other O.R.S.'s look to your laurels and keep your nose clean for sure as shootin' you'll not only lose your appointment, but get in "dutch" with the gang. Let's get started on the right foot. (Ask Himoe if it doesn't pay—he's attending the National Guard Encampment now. Hi.)

9CCS got a hundred thru the ethereal explosions. A number of the other fellows handled traffic but they were all considerably under the hundred mark. Until fall, this is to be expected, but don't let's quit the ol' set entirely. Lot of good nights left.

NEBRASKA—Station 9YU of Crete is the star station for the entire district for this month, with a total of 250 messages. 9YU should be commended on his consistency. Only three other stations operated in the southern district of Nebraska—9EAK with a total of 60 messages, 9DNC with 52, and 9BWE with 27—making a total for the southern district of 389 messages. 9DNC reports radio activity in Lincoln absolutely nil. Chansky reports the following for the northern part of Nebraska. 9DSM is in Europe and it is rumored that he is snooping around for some foreign tubes. 9AIN is reconstructing his set for the coming season. Chansky complains that it is next to impossible to get letters out of the stations in the western part of the state. 9EGA handled 191 messages this month and 9AQK 150. 9DXY is inoperative except on A.R.R.L. Broadcast messages. Message total for the entire state—730.

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

The reports from New Hampshire and Connecticut are missing. The Division Manager wishes to call to the attention of the Assistant Division Managers that when they fall down and fail to send in a report, it not only concerns them personally, but fails to give men in their districts any written credit for the month's work, which the various stations perform during the month. This is rather a hardship on the men, and these two

states have now failed two consecutive months to send in any report. It only takes a few hours work to prepare a report and it does seem that for the sake of our A.R.R.L. there is no real excuse for failing to put in this amount of time once each month.

MAINE—Mr. McShane is turning over his files, etc. to Mr. Hilton, who will now have charge of Maine. 1FM has four tubes going, and has worked WNP and about half the U.S. He has taken on another operator, Leon Blackwell, who signs BZ. 1BAS reports that his section has been badly affected by the summer weather, static, etc. 1ALI and 1CKQ are both up and coming. 1KX has done real well with 50 messages handled, and has shown a lot of enthusiasm in wading the bunch up. 1FB is working with 500 cycles I.C.W. 1BDV is on with a spark at present, but will have C.W. soon. 1AKI has 10 watts going this summer.

VERMONT sends in a report of 104 messages which, considering Vermont's all year around performance, is a fairly good summer month's report. Most all this work was done by 1CPO who handled 98 messages. The D.M. well realizes that Slayton is handicapped in this state. Slayton has often been heard on the air at three and four o'clock in the morning for messages.

CONNECTICUT—MISSING. 1FD has greatly increased power, and is nightly on the air. It promises to be one of our star stations. Will 1QP please give us a good excuse for failing to file a report this month? The one about Camp Kewpie is now worn out.

MASSACHUSETTS—1JV has been appointed an O.R.S. He uses 100 watts C.W. 1DY threatens to open up on his old stone crusher if his gang don't get a move on. 1LK handled 108 messages. 1SK handled 157 messages. 1RR has no messages to report, but says he will be going with 100 watts C.W. 1CK reports that it is too hot, too much QRN, and too many BCLs for him to do any operating. 1AAC reports 108 messages handled, through very heavy static. 1AJS handled 75 messages. 1COT 72 messages with no "rubber stamps." Mr. Lee Bates, D.S. at Worcester, reports the activities of 19 stations, the star being 1CPN, who handled 1129 messages. This is excellent work for this time of the year, and 1CPN is to be congratulated on this report. 1ADN is rebuilding his station. 1AJJ and 1CNA are new stations. 1AQM has returned to 15 watts and is getting into the ninth district nightly. 1GY is handling and directing traffic through the district, during daylight hours. Bates has made a complete inspection of his district, touring the same by auto, and he is getting out a booklet which gives the activities of the A.R.R.L. members in his district. 1BDU reports that his aerial blew down in a storm. Helen G. Daniels, Executive Assistant to A. S. McLean, sends in a very good report for Western Mass. She reports the district in general, as being inactive. Dist. No. 3: Berkshire county reports traffic only. Dist. No. 4: Hampden county reported no activities other than traffic. C. M. Weller finds his town so well behaved and quiet that he is taking a vacation, leaving 1BYR to handle the extensive Westfield traffic. 1KC is operating on 250 watts and has been heard in Seattle, Panama, and Cuba. Dist. No. 6: Franklin county reports no traffic moved in that district this month. 1BSZ has closed down until fall. 1BBM has a phone working and has been heard in Gloucester. 1ANA has been doing some remarkable work with WNP. He has received several press messages from WNP off Labrador and has frequently been heard working well into the early morning hours. This station has lately been appointed O.R.S. 1CCZ at Wianno has opened again for the summer, and has been heard working 2's, 3's, 4's, 5's, 8's, 9's, and calling a 6.

RHODE ISLAND—D. B. Fancher weathers the hot climate well and sends in a very complete report. 1GV has done some very good DX work. 1BYB handled 112 messages which is considered good for this time of year. 1OW reports that most of the stations are rebuilding their aeri-als and transmitters to comply with the new laws.

1GV is putting up some new towers and, from the report, they will run close rivals to the "little sticks" at Radio Central. 1CDM has opened up at Watch Hill with a 50 watt tube, which sounds a great deal better than his old rock crusher did. 1BYB reports that no rubber stamp messages will be accepted by any O.R.S. in this state, so don't try to pass any through. Mathewson in the Newport section reports that things are picking up in fine shape. 1AML is doing very good work, and is said to have an excellent fist. 1APG and 1AIU are being used by military authorities just now. They are located at the Army Post at Ft. Adams. Geo. Mathewson, who is C.M. of Newport, has also been appointed D.S. of that section. 1AML has been appointed O.R.S.

NORTHWESTERN DIVISION

Bird B. Bliss, Jr., Mgr.

WASHINGTON—Dist. No. 1: It appears that 7JS is trying to break a record for burning out fivers. Dist. No. 2: Relay work is about at a standstill in this district. 7ABB is over at his summer camp where he will operate a spark coil C.W. under the call 7SE. Dist. No. 3: 7WS has been the mainstay here while the rest are either remodelling their sets or are out of town. 7OE has dismantled and is ready to move to the east coast. The men of district 3, as well as all others in the state, wish to thank him for the valuable assistance he has rendered us during his stay in Bremerton, and hope to again hear his familiar fist signing a "7" some day. Dist. No. 5: Ac-



7BA, TACOMA, WASHINGTON IS A MACHINIST

tivity has centered mostly around Tacoma and Olympia. In Tacoma there are the usual number of stations on the air getting traffic through and calling "CQ"—(Who is he?—A.D.M.) 7WN has erected a new pole after trying three times and now expects to work Africa. 7RB and 7WX have consolidated stations. 7GP is going to double his present power to 200 watts soon. (Watch that Hoover Cup next year, you eastern birds.) Dist. No. 6 reports that traffic is on the blink on account of static and rotten QRX periods. 7BJ and 7LY have turned in good traffic figures. Dist. No. 7: 7AIY is the only one reporting and due to his moving has not been on much. Dist. No. 9: 7GE has been off account of being in the hospital. He has a YL operator. Dist. No. 10: Spokane has formed a C.W. club. (More power to you. All that's left for them to do now is to name their D.S.) Seattle: Most of the stations are remodelling and are off for the summer. 7OO has sold his C.W. and turned BCL again this summer. Annual occurrence. 7IY has made a Beverage and is getting the nines fine.

OREGON: Dist. No. 1: Most of the stations in Eugene are remodelling for the coming winter season. 7NL, who used to be MF, is building a new ten watt watter with meters. Hi! 7HF has gone to sea, and 7LR is completing his 100 watt. 7IW is now using a 50 in place of his five. 7RT and 7AHZ each have five watts and are getting good results. 7FH has been burned down. HEX. Dist. No. 2: 7HA and 7AGE are handling all the traffic. 7OH is holding his own with the QT's out of town, making money for that fifty watt. In this

district the QRN has not stopped the fellows from being on the air. Dist. No. 4: Few are on the air on account of the static season. 7TT and 7TO are handling most of the traffic in Portland. 7ABS is planning his 100 watt set for the fall. Dist. No. 7: Most of the fellows are out working for new bottles, etc. Traffic is moving slowly. Dist. No. 10: 7JE is handling the traffic through Pendleton and 7ABY at Milton is on occasionally. O.R.S. appointments are being given out and new routes are being made. Daylight schedules are being handled with Salem for Southern Oregon.

IDAHO—Dist. No. 1: For some time past traffic has been moving very slowly, but we have now a 100 watt set in 7JF at Moscow. He has been getting some excellent results with a five. Dist. No. 2: 7IO has just had the hard luck of burning out his last two five-watters and is only waiting for the new ones to start operating again. 7ACX at Buhl has a 10-watt set coming up and will be operating very shortly. A five-watt set will be operating in Pocatello soon, if the wind will permit a mast to stand up long enough to call "CQ." 7LN has been doing very good work reaching out thru the QRN with his new antenna and counterpoise. 7PJ and 7ZN are not on very regularly on account of work QRM. 7HJ is remodeling.

ONTARIO DIVISION

A. H. Keith Russell, Manager

July with its consequent heat has taken a lot of the DX merchants off on holidays, with consequent loss to traffic handling. Owing to a vacation on the part of the Division Manager, the traffic reports were not sent to him and so no message reports can be shown.

From the North, Hale in the Soo reports that all spark apparatus has gone to the junk pile and that 3SL among the rest has decided that 100 watts will fill the bill this fall. This is fine news for we need lots of men up there. Gravenhurst has just been heard from in the person of 3ADJ whose code doesn't yet equal his signal strength, but will be a valuable addition to the ranks this fall. Work hard, Bickmore!

Toronto and district still has a bunch of old reliables working hard notably 3OH and 3OJ. 3CO and 3GK are also working frequently, the latter reporting great success with working on the fundamental wave of his aerial, 180 meters. I guess we will have to beat it down to 150 and try it out. 3TJ is off till fall. 9AL is on again, having repaired generator.

ROANOKE DIVISION

W. T. Gravely, Mgr.

Reports are slack this month but all A.D.M.s are actively on the job and are hopeful of bringing out the most successful organization the Roanoke Division has ever had. There are no idle boasts being made but there is some great team-work being done, and with the cooperation of the personnel many difficulties will be surmounted.

WEST VIRGINIA: A.D.M. Bock, 8AUE, is away on his vacation, visiting various eastern points by the auto route, so our old friend Heck compiles this data. Dist. No. 1: 8SP is obliged to reconstruct aerial and masts, due to building operations in vicinity. Much rebuilding and remodeling is going on in the entire state. Dist. No. 4: There is a new station being operated at Camp Greenbrier at Alderson, with 20 watts, in charge of Steve Phelan of SRL. Dist. No. 5: 8BDB is moving his station to new quarters. 8CQH is rebuilding and blowing 50-watters for pasture. 8AIP seems to be our most thorough-going experimenter and is evidently learning how things work at first-hand. Has been trying out tuned R.F. using neutralization of capacity, and says it seems to be FB. Brings in more than ordinary regeneration but not much louder on strong signals.

NORTH CAROLINA: Those fellows over in the eastern part of the state continue to handle traffic, with 4FT heading the list. This one has a clean

piercing note which seems to cut right through all kinds of interference. Don Parsley seems to be able to place those signals anywhere he wants them to go, and can run any of the gang a tight race. 4BX and 4EA are doing their bit and both have splendid stations. 4AF is on the job. 4GX is on the air again with 100 watts and will be glad to QSR south.

VIRGINIA: Dist. No. 2: 3ABS is preparing for the fall rush. 3SG delivers them all upon receipt. 3BMN, 3AUU, 3BCH, 3AOT are remodeling, and will be in next month. Dist. No. 3: 3CEL is sticking by his guns. 3BIJ, 3MO, 3NO, and 3CDZ are on occasionally. 3BVL is operated by Teddy Keck, just home from V.P.I. He comes on at 4 A.M. 3NF made a report after having worn out his "bug." Dist. No. 4: 3TJ is doing some work but business prevents much operation. Dist. No. 5: 3IW is doing about the usual summer work. 3BUY handled considerable traffic. Dist. No. 6: 3HU is touring in Germany. 3YV, 3ALB, and 3BFE are closed for the summer. 3CBZ and 3BHL are holding forth and handling traffic. Dist. No. 8: 3APR is leaving us to take up his duties in West Virginia. His going makes us heart-sick, and though he will still remain in the Roanoke Division, it isn't like having him close at hand. 3AEV and 3BZ are on occasionally. Dist. No. 9: 3RF is about to come out of his hole. 3BIY will possibly open up at a new location. 3BDX, 3BHP, 3VC, and 3HL are out for one reason or another and will resume soon. 3CA is wondering how he can be heard on his short wave. 3ZZ has left the Catawba Sanatorium and returned to Cradock, but expects to go to Youngstown, Ohio, in the near future to live.

PORTO RICO: Nothing this month from A.D.M. Rexach, as was to be expected. Brother Rexach is now up in the mountains of Porto Rico on an engineering project, and is about as much isolated as Donald Mix. However, like Mix, he carted off a receiving unit so as to relieve the silence, and to be able to keep in touch.

ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

COLORADO: 9AMB, the Hathaways of Denver, again takes the box seat for traffic honors, with 153 messages on C.W. We are glad to see you back on the air again, OMs. 9CAA follows a close second with 107 messages. 9QL reports nothing doing this month. 9DTM is closed for the summer. 9CFY is on every chance he gets when QRN will permit working. 9BVO will again be hitting on all four as soon as a new filter is installed. 9BXA reports no traffic due to rebuilding. The following other stations reported but are out of commission for various causes, 9BUN, 9DHI, 9DTE, and 9COW. The following stations failed to report at all: 9BJI, 9BXM, 9BXQ, 9CCJ, 9EKH, 9FV, and 9XAQ. (Report, men, to your D.S. whether you have traffic or not. We want to know that you are still in existence. Report and keep up the pep and when fall arrives we will be ready to shove off immediately.) The showing this month is slightly better than last and the D.M. hopes to see it gradually improve from now on.

WYOMING: Wyoming has not been very active this month. Two special stations have not been in operation pending the issuing of new calls until the examination can be taken for the new special license. 7DH put through 24 before he went on his vacation. 7ZV slipped thru 10 for a starter. 7ZV has lost his second trick operator in the person of Slauson, old 7ZG who left for the west coast. We deeply regret the losing of this old timer and hope that 7ZV will soon recover from the loss and be hitting the ball hard again. (Many years of good luck, Slauson, from the gang in Wyoming.)

UTAH: For the second consecutive month no report of any sort has been received from Utah. Men, if you want any representation in QST, you will certainly have to pass along some dope to the D.M. or your space will be blank. What's wrong out there? The rest of us have not quit! Do we get a report next month?

WEST GULF DIVISION F. M. Corlett, Mgr.

Division Headquarters has moved. The new address is 2515 Catharine St., Dallas, Texas.

Quite a few of us will doubtless be reading this issue of QST in Chicago while we attend the SECOND NATIONAL A.R.R.L. CONVENTION, SEPT. 12-15; and here's hoping every one of us will be there.

The reports from the field during the operating month are very encouraging. There is a slight decrease in the total messages handled, but the number of stations reporting shows an increase. 17 additional A.R.R.L. stations were added to the ever growing list representing 13 towns, many of which have had no A.R.R.L. relay stations until now. O.R.S. appointment was issued to 5ALR. Twenty-one other stations have been recommended for O.R.S. appointments due to their efficient handling of traffic, their prompt reports each month, compliance with U.S. Radio Laws and Regulations, and the traffic rules of the A.R.R.L., which are the requirements.

Summary of messages handled by stations:

Northern Texas	2388
Southern Texas	537
Oklahoma	366
New Mexico	9
Mexico	56

NORTHERN TEXAS: Dist. No. 1: Denison: 5AHC, 10-watter, works ones and eights. He is on regularly and wants a route to Oklahoma as he has message traffic north all the time. Terrell: 5UD, with spark, moved 282. 5OQ had transmitter trouble, but is OK now and will be on regularly. Texarkana: 5AER moves traffic best between 7 and 8 P.M. He is putting in three 50-watt bottles. Mt. Vernon: 5FP is a new A.R.R.L. relay station. He is OK and ready for traffic. Sulphur Springs: 5JH on spark is handling traffic OK. Grand Saline: 5ALI with 10 watts R.A.C. works from 6:30 to 7:30 A.M. and 12:00 to 1:00 P.M., also 5:00 to 8:00 P.M. 5AMS is another new A.R.R.L. station and makes the second transmitter for this point. He is ready for traffic. Denton: 5NW and 5NY are both working OK and traffic is moving. Greenville: 5IS is out of commission for about two months. 5ACQ, both spark and C.W., is increasing to 50-watter. Traffic is moving OK. 5GO has moved to Hobart, Okla. Bonham: 5ANA is a new A.R.R.L. station owned by L. C. Bowling, 300 East Fourth St.

Dist. No. 2: 5AJT has been appointed D.S. of Waxahachie, West: 5FA of the "5-watt brotherhood" is having trouble with QRN and QSS. He handles message traffic OK with Dallas and Ft. Worth, has difficulty working south. He has a new antenna and counterpoise under construction. Cleburne: 5AFH, 5-watt I.C.W., is changing to 10 watts R.A.C.—QRN from work but moving traffic OK. 5UY, although busy as "an ant on a hot shovel" with outside work, is also QSR. Jacksonville: 5FC is moving traffic OK, QRN heavy. He will have a 50-watter going soon. Waxahachie: 5AJT handled a "bakers dozen" (13) on spark. Tyler: 5PH, operated by J. H. Lamb and John M. Burke, Jr., is a new A.R.R.L. station placing this place on the relay routes.

Dist. No. 3: 5UO has been appointed D.S. of Wichita Falls. Wichita Falls: 5UO and 5UN are out of commission installing a 50-watter. 5LL is working OK but will be leaving for school soon, as will 5ZADA. 5CY has moved to Ft. Worth.

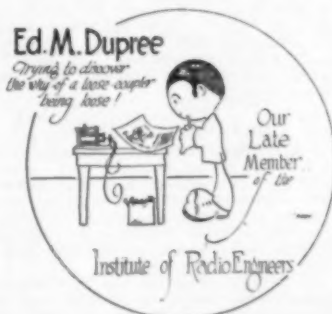
Dist. No. 4: Grandbury: 5NS using 20 watts pure D.C. C.W. has a new 100-foot aerial. He is on watch every night from 12:00 to 6:00 A.M., and traffic is moving OK. Brownwood: 5AJI is a new A.R.R.L. station. Dublin: 5XAJ is moving traffic, but very little DX work due to bad QRN.

Dist. No. 5: 5ZH now using 100 watts D.C. C.W. QRN is bad but he is still pushing thru. Colorado: 5OQ and 5PN are both new A.R.R.L. stations and are doubtless ready to go. (Let's hear from you fellows.) Fort Worth: 5QL, City Manager of Ft. Worth and Tarrant county. 5MN leads with 267 messages and 5AIF is second with 263. Sorry to hear that 5AIF is moving to Los Angeles, Calif. 5KO is doing good work. 5SF

is spending the summer in Rockford, Ill. 5AHT maintains a daylight schedule with Houston, Kansas City, and San Angelo. QRN has 5QI "buffaloed." School and girls account for 5TC's nil. 5DI is undergoing repairs. 5TI is on the job at Arlington. Dallas and Dallas County: 5VA, the City Manager, has resigned. 5IS is having excellent results working on 150 to 180 meters, handling traffic with Memphis and Houston with ease. 5HY works both spark and C.W. 5AJJ (C.W.) and 5AIC (spark) complete the reports from Dallas, proper, while 5CT (CQ Texas) Vickery, with both spark and C.W., helps swell the total.

SOUTHERN TEXAS—5YK, E. A. Sahm, New Brunfels, Texas, has been appointed A.D.M. in charge of Southern Texas, succeeding 5ZX, A. P. Daniels of Houston, resigned.

Dist. No. 6: Galveston: 5VY says QRN has not stopped him but it sure did check his speed. Traffic is moving OK. He still works DX, 9th,



4th, and 8th districts, and has been reported in 36 states; also Canada, Mexico, Porto Rico, Hawaii, and Panama—all radio districts and a ship 5,000 miles S.W. Galveston. 'Tis rumored that 5IM has fallen for a "flapper" maybe. Port Arthur: 5OC is the only station reporting this month. He will be off about thirty days rebuilding. Houston and Harris county: 5AE is City Manager. 4 stations handled 129 messages, 5BA leading with 57, 5RN second with 45, 5JM third with 22, and 5ZX with 5. 5JM will be shut down during August.

Dist. No. 7: Austin: 5ALR seems to be holding 'em down the Capitol City way. 5RN is closed for the summer. Lockhart: 5UJ is leaving for school, which leaves this place without a relay station. Beeville: 5GR is attending military training camp. He will have a 100 watt D.C. C.W. set, and 100 foot mast when he returns. Cuero: 5JT is out of commission rebuilding. 5RA is out of commission.

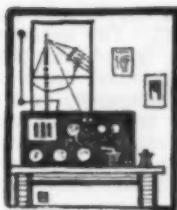
Dist. No. 8: 5ZAE is D.S. of San Antonio, Texas.

San Antonio: 5VO had a fifty "go west" July 15th and has not been on much, but leads the bunch with 61. 5ZAE, 5AEW, and 5KG are working OK. 5KG has a new antenna under construction. 5ZAK is out of commission due to moving. He will be back on even a larger scale. Laredo: 5MT still maintains a schedule with "BX." San Angelo: 5JC is going OK on 5 watts. 5CE tops the list with 45 messages, most of them to and from "BX" in Mexico. He also had a "fire bottle" pass away while working 9BEZ. Routes west from San Angelo are not so good but are now relaying thru Denver stations. San Benito: 5ADI is holding down this place but is having some transmitter trouble just now. Pearsall: 5SS "QRN and 41." (Short and sweet, but tells the story.)

Dist. No. 9: 5DE's set is on the blink. He is having a time making her go. 5ADB is undergoing repairs.

OKLAHOMA—Dist. No. 1: Oklahoma City: 5KE and 5KW are the only stations reporting

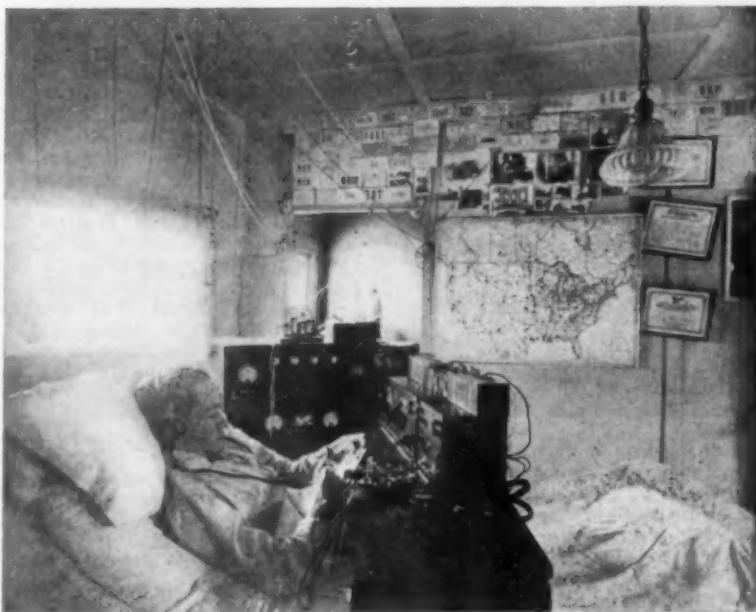
(Concluded on page 53)



Amateur Radio Stations



The Most Southwest Station in the U. S.



Far down in sunny California, sixteen miles south of San Diego, near the Mexican border, lies the little town of San Ysidro where 6ZH is located. Known not only as the most southwest A.R.R.L. station in the country but as a station operated by Lester Picker, a real amateur, this station has a long list of DX records to its credit.

It has been in operation for a long time, and has always been one of the best stations in that part of the country. Before the days of C.W. the spark set, under the call 6AJH, enjoyed the reputation of having its signals copied by amateurs within a twelve hundred mile radius practically every time the key was pressed. When the present tube equipment was installed and the call changed to 6ZH in September, 1922, previous results were immediately eclipsed, and at the present time 6ZH continues to remain

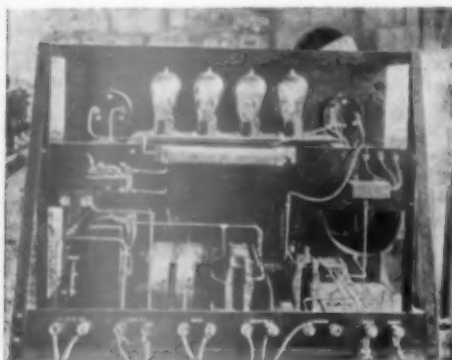
one of the best known and best operated stations on the Pacific Coast.

Nearly two years ago when Picker was installing a new mast at his station he experienced a great misfortune. A guy wire broke and he fell fifty-five feet, sustaining a broken back. Since then he has been confined to his bed, but remains one of the leading amateurs in southern California. On the air every night, the signals from 6ZH are instantly recognized by amateurs throughout the country.

The set is operated from his bed, as can be seen from the photo. The switches on the wall controlling the power to the set are operated by the strings in the upper part of the picture. The receiving set is a Grebe CR-5 and a two stage audio amplifier. In the far room, behind the C.W. set, may be seen the O.T. of the old spark set.

An idea of the range of this station can

be gained from the map on the wall. Each dot indicates a distant station worked, and if we could look closer at the map we could see at least one dot in each of thirty-one states. The best DX worked is to 3BLF, 8AMM, and to Canadian 9BP, the latter being 1600 miles to the northward. 6ZH has been heard by stations throughout the United States and the southern half of Canada, and also in Panama, Alaska, Mexico, Porto Rico, and



Rear View of 6ZH's Transmitter

Hawaii. One ship 975 miles east of New York, another 450 miles east of New York, and still another 4,000 miles west of San Diego, have copied the signals of 6ZH.

The antenna system consists of a beautiful nine wire cage, nearly vertical, 90 feet in height and 60 feet long. The upper part is five feet in diameter, tapering to three feet with a 6" cage leadin. No ground connection is used, except for receiving. The counterpoise has fifteen wires about ten feet high, arranged fan-shape under the antenna.

The neat panel transmitter, which was built according to Picker's specifications, utilizes four of the so-called five-watt tubes in a Colpitts' circuit. The D.P.D.T. switch in the center of the panel connects all of the tubes in parallel as C.W. oscillators when in one position. Thrown the other way, the switch connects two of the tubes as modulators and the other two as oscillators for phone work. Used in this manner as a ten-watt phone set, 500 volts is put on the plates, the total plate current is 150 milliamperes, and the antenna current is two amperes. The best DX worked on phone is over 1,200 miles to 9BKK in Kansas City, Mo.

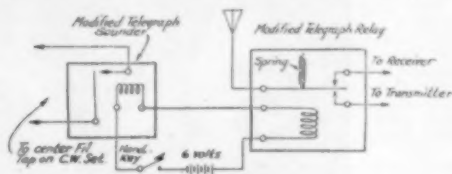
The rear view of the transmitter gives a good idea of its general arrangement. The set is wired with small copper tubing and all external connections are brought to the terminal board at the rear of the set. An Esco 1,000-volt 250-watt motor-

generator is used for plate supply and the filaments are run from A.C. The antenna current, when using C.W. is 3.4 amperes on 240 meters (special license) with a plate current of 200 milliamperes, and a plate voltage of 900. To the left of the transmitter panel is a small sub-panel (not seen in the picture) on which are mounted within easy reach the necessary switches for changing the plate voltage, wave length, and various couplings.

The Break-in System

An ingenious feature of the station is the break-in system employed. It consists of two relays, their solenoids, a battery, and a hand key all connected in series. One of the relays serves as the relay key, and controls the oscillations in the transmitter by making and breaking the lead to the center filament tap. The other relay connects the antenna to the transmitting set when the hand key is depressed and when the pressure is taken from the key a spring draws the armature of the relay back to the receiving position. Thus the antenna is always connected to the receiver unless the transmitting key is down, and no current is taken from the battery to keep the relay in the receiving position.

It is important that the contacts on the relay key be adjusted farther apart than those on the antenna send-receive relay in order to insure that the antenna



THE BREAK-IN SYSTEM AT 6ZH

will be connected to the transmitter a split fraction of a second before the oscillations are started in the set.

A Word About the Relays

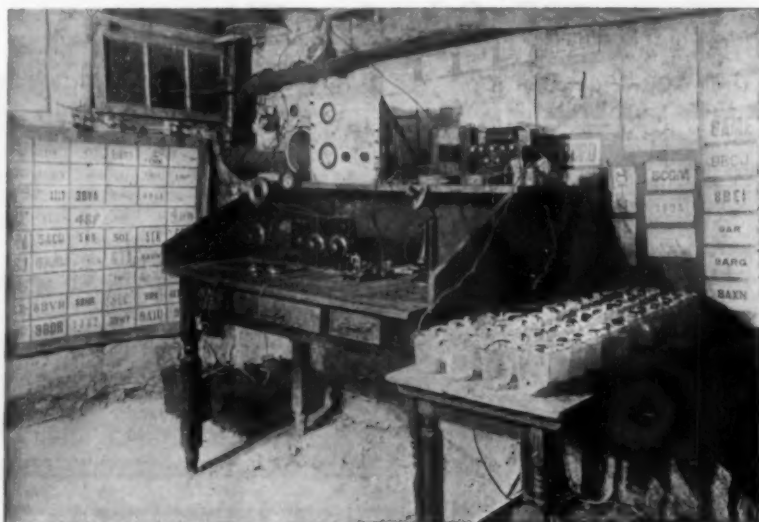
The one controlling the power to the set may be an old telegraph sounder with a set of contacts built on to it; or it may be an ordinary telegraph key with a couple of buzzer magnets fastened to the table below the key knob, arranged to act upon a soft iron armature that is fastened to the key lever where the knob would ordinarily be. For the antenna relay 6ZH uses a telegraph relay that has been rewound to a lower resistance. Because it is in the antenna circuit, special care should be taken in the insulation of its contacts. For a small set, a good insulating bushing at one of the stationary contacts is sufficient, but for larger sets a relay specially built and extremely well insulated is necessary.

Nevertheless, the above break-in system

works with entire satisfaction and not only saves the operator the trouble of throwing a switch to send or receive, but has the additional advantage that it allows the other operator to "break-in" on his transmission at any time.

In conclusion of our description of this station, let us again say that 6ZH is a genuine amateur station, and that its operator will always welcome station photos, cards and letters from the gang.

9AOG, Lawrence, Kansas



Station 9AOG, located at Lawrence, Kansas, is owned and operated by Clifford Himoe, A.R.R.L. A.D.M. for Kansas.

The antenna is a thirty-inch cage of four wires, forty feet high and sixty feet long, of the inverted-L type. A fan counterpoise of the same length as the antenna leads to a ten-foot spreader at the base of the antenna mast. The counterpoise at one time contained nine wires, but became so full of joints where the local BCL's cut it that a new one, which at present has five wires, was erected. (Incidentally, 9AOG now QRX's during the early evening hours and has an alarm circuit fixed up to protect the new wire.) Insulation is electrose thruout, but now that C.W. is installed, it is hoped that some good porcelain insulators can be obtained.

For transmitting, two UV-203's are used and the antenna current with 2000 volts on the plates and ten volts on the filaments is slightly over ten amperes. Nearly all work is done with an antenna current of six amperes and 1000 or 1500 volts on the plates. An Acme 250-watt plate transformer, used in conjunction with a 48-jar chemical rectifier, furnishes

the plate power. A 25-henry choke is connected in the positive lead to the plates and a 1-mfd. condenser is connected across for by-pass. A home made transformer supplies the filaments, with a forth-ohm rheostat in the 110-volt side for regulation. The oscillating circuit is the familiar reversed feedback circuit. The main inductance is the Radio Corp's type and the grid coil, three inches in diameter, is placed inside of it. The bug key is placed in the lead to the mid-tap of the filament transformer.

A one-tube receiver is used with the "4GL" circuit such as was described in the June, 1922, issue of *QST** by F. A. Hill. The tuner has all the advantages that Mr. Hill claims for it and more. Local QRM on it is absolutely nil. It is a rare night when all districts are not logged on this tuner. A six-ampere Tungar bulb is used to keep the "A" battery in shape with a circuit very similar to the one described in February, 1923, *QST** by 9AOQ.

Results at 9AOG have been very surprising, considering the antenna system,

*Can be obtained from the *QST* Circulation Dept. at the regular price.

and the location probably deserves a lot of the credit. Last year with five watts and one ampere in the antenna and 60-cycle A.C. on the plate, 5ZA was worked for 15 minutes at 1 P.M. in broad daylight. Although good DX has been accomplished with the 50 and 100-watt sets, the above is still held as the station record, considering the power used at the time. During the past winter stations in 42 states

have been worked. Stations having heard 9AOG include those in 43 states, Hawaii, Mexico, and Canada. Ships at sea 1350 miles northeast of New York, 3400 miles southwest of Panama, 2770 miles west of San Francisco, and in the Pacific and off the coast of Alaska have copied this station's signals. 9AOG is an active A.R.R.L. station and during the past winter it handled an average of 350 messages per month.

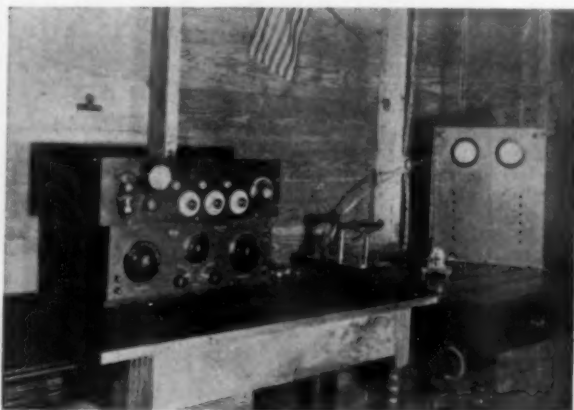
8GZ, Columbus, Ohio

Receiver: Grebe CR-3, detector and two-step audio amplifier with Brandes phones.

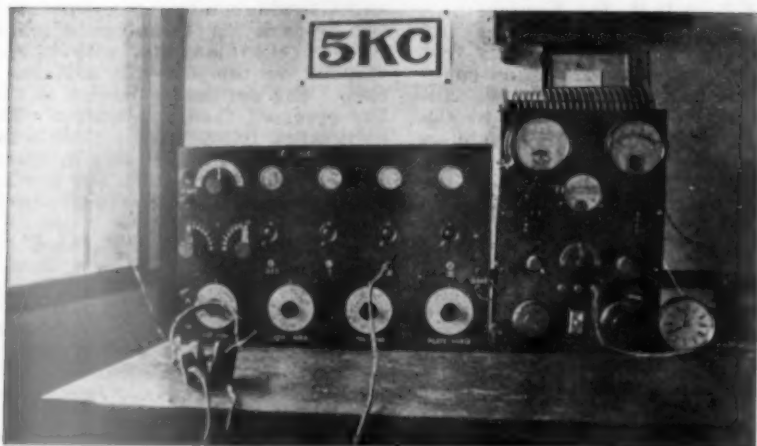
Transmitter: Fifty-watter in reversed feedback circuit with series plate supply. Chemical rectifier; 1000 volts on tube. Antenna current 4 to 5½ amperes.

Antenna: Six-wire tapering cage, five feet at top to 18 inches at lower end, 60 feet long, 40 and 55 feet high; cage lead-in.

DX: Works 'em from 40I to 6XAD. Heard in Panama, 2,000 miles east of New York, etc.



5KC, Plaquemine, La.



5KC, owned and operated by Vincent Rosso at Plaquemine, La., is one of the low powered stations that is doing excellent work. Using four so-called five-watt tubes, 5KC's signals have been reported

heard a distance of 6,000 miles by a ship operator at sea, 2,100 miles east of Sydney, Australia. 5KC also has transmitted messages to Mr. Carl G. Brown at Ancon, Panama, which were QSL'd by cablegram.

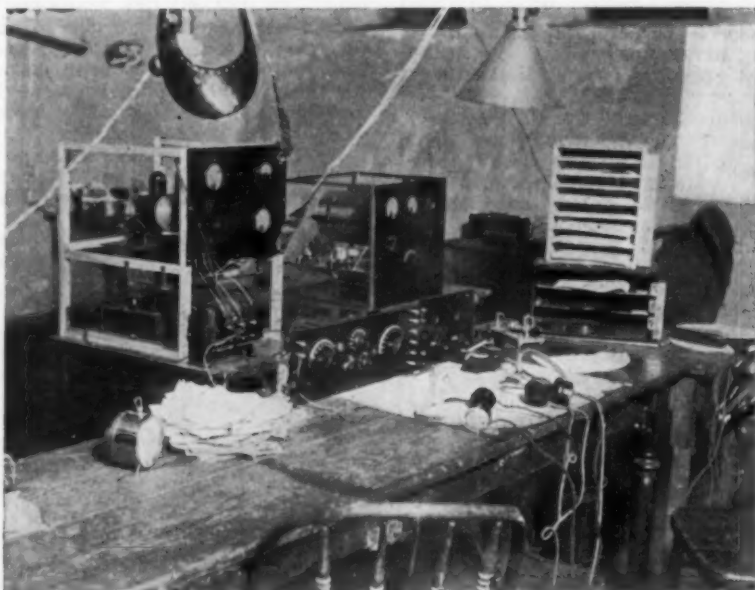
The receiver, to the left of the picture, is one of the conventional short wave regenerative type, used with a three-stage audio amplifier. Only one stage is used for amateur signals, however.

To the right is the transmitter. Four tubes connected to a Hartley oscillating circuit are combined into a good looking panel set that works. The inductance is twenty turns of No. 6 copper wire, seven inches in diameter, and a .001 microfarad condenser is connected across it to aid in tuning. Plate power for the set is

rectified by a bridge type rectifier using 32 pint jars filled with a borax solution. A two-microfarad condenser, bridged across the plate supply, smooths it out to a considerable extent.

The antenna is a five-wire T, eighty feet long and sixty and sixty-seven feet high at the ends. A one-wire counterpoise ten feet high and a ground are used. When putting 4.2 amperes into this antenna, the stations worked include those in Canada, Mexico, Maine, and California.

3XM, Princeton, N.J.



3XM, Princeton, N. J.

Here's the station that put over 4000 messages in four months and was the first station in the history of amateur radio to handle more than 1000 messages in one month. The seven operators who are responsible for the success of this station were too busy handling traffic to write us a nice description, but we're mighty glad to see what the inside of the station looks like, anyway.

3XM is the station of the Princeton University Radio Club, School of Science, Princeton, N. J. In the photo, the original transmitter is on the left. It is a 100-watt half-wave self-rectifying set, using the 1DH circuit with 1,500 volts A.C. on the plates of two UV-203 tubes. Another transmitter, using full-wave self-rectified 60-cycle supply in the 1DH cir-

cuit may be seen near the message rack. Either of these sets put about five amperes into the cage antenna. A fan-type counterpoise covering as much area as possible is used.

A Reinartz and two-step, a vibroplex, an eleven division message rack, an alarm clock, and a well-worn hook with the traffic of an afternoon on it complete the picture of this "go-get-'em" station.

When submitting a new receiving circuit, please tell us how the new circuit compares with a standard regenerative receiver with one tube as regards sensitivity, selectivity, and ease of tuning. This will help a great deal in our judging the value of your new circuit.



INTERNATIONAL Amateur Radio

TWO-WAY TESTS!

Transpacifics—Transatlantics

Two-way tests across both oceans are being arranged!!

Present prospects are that the Transpacific Tests will take place sometime in the fall—about the last of October. Arrangements are in the hands of the Southern California Radio Association (6KA, president), the Radio Journal (Los Angeles), and the Operating Department of the A.R.R.L.

Arrangements are under way with British and French organizations for more Transatlantic Tests this December. During our early evening quiet hours for a week or ten days we will listen for European signals. If successful, two-way communication will be established later.

Watch QST and the weekly A.R.R.L. Broadcasts for additional information!

A New Station in France

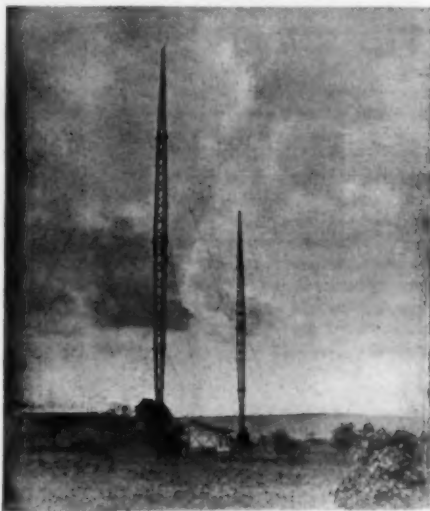
The foremost French amateur radio magazine, *La T. S. F. Moderne* (Modern Radio), is erecting a station that will undoubtedly make a name for itself shortly after it goes into operation. Located on a high hill, on the outskirts of Paris, and equipped with two transmitters, one of 100 watts and one of 1000 watts of power, the signals of SAE will most likely be heard over great distances this winter.

In France there is not the great interest in relaying or transmitting there is in this country. This has caused the French amateur to turn to experimenting with receiving apparatus as his main method of attack in the radio game.

To serve the amateur has been the outstanding purpose of *La T.S.F. Moderne* since its inception several years ago. It encourages communication and research work on short wave lengths, and has created a medium of exchange for ideas

much like our A.R.R.L. Information Service, devoting great care to amateur problems. In addition, this magazine has been chosen as the official organ of the *Society for the Study of Radio Telephony and Telegraphy*, a French organization embracing nearly 50 affiliated clubs throughout Europe, and also of the newly formed *Club of 8's*.

Because of *La T.S.F. Moderne's* position as the "QST of France" it can be seen how SAE will be sort of a "headquarters



The Masts at SAE.

station," and will serve several purposes. Technical talks and news of interest to amateurs will be sent out from time to time to all French amateurs. On other occasions messages will be sent at a slow speed to encourage amateurs to learn the code. As transmission will be mainly on 200 meters, this station will furnish French amateurs with a steady signal of that wave length, greatly aiding them in developing short wave receivers. Technical questions will be answered over the air and, with the cooperation of the *Club of 8's*, it is

expected to do some concerted research work on short waves. Although at times a few concerts will be sent out, 8AE is an amateur station, there being no intention to compete with the programs of the regular broadcasting stations.

The illustration shows the station site and masts just after erection. They are guyed, of wooden lattice construction, triangular in section, and about five feet on a side at the widest point. Wood was used as a material, it is stated, in order to minimize absorption losses when transmitting. Although 115 feet in height, they were each completely assembled on the ground and raised in one piece with the aid of shears 55 feet high. The masts stand 165 feet apart and rest on special ball-and-socket joints at their lower ends.

will hear us—that was proven last winter. It now remains for them to get transmitters that can be heard consistently in this country. The A.R.R.L. Information Service* has assisted many European amateurs along this line, because we "have the dope" on transmitters. In return, the British amateurs have sent us information on receiving sets that will positively receive transoceanic signals.

Letters from over there indicate that a great wave of enthusiasm is fast replacing the stolid air of uncertainty that in measure has prevailed heretofore. W. R. Burne, 2KW, has obtained a 250-watt alternator and hopes to push across some dope with it. He says, "My object is two-way working and regular schedules.... Every night next winter I will be on the



A glimpse of English 2SH in the experimental stage.

The station building is a small, two-room house, centrally located between the masts. Single phase A.C. is supplied the station at 110 or 220 volts, driving two motor generators. One has a 12-volt generator and is used for battery charging; the other has a double commutator high voltage generator supplying D.C. at 1000 volts, for the 100-watt set, or 2000 volts for the two 500-watt tubes of the big set. The filaments will be heated by A. C. The normal wave length used by the station will be 200 meters but circumstances may warrant the use of a 350-meter wave in addition.

English Amateurs Tuning up for Winter Work

With the coming of winter in sight, with its long cold nights, when static is nil and signals are QSA, our English brothers are building stations and planning to definitely establish two-way communication with this country. They already have receivers that

job meaning business, so count 2KW in on any of the 'round-the-world relays. All my time is spent in planning and erecting my station for some good work next winter."

None the less enthusiastic is Mr. Frederick Hogg, 2SH, who states, "I expect to be going about two months before most others and intend to have 1000-watts input, which means about 12 amperes in the antenna. My aerial will get red hot if I don't take care. I'll let you have a schedule as soon as possible. I should like to receive suggestions as to the best times, etc. Nothing doing here in reception until after 0315 G.M.T. each day.

"I enclose a picture of my junk, including my transmitter; Colpitts circuit with 500 cycles rectified A.C. at about 1000 volts across the condenser in the earth lead. The fine wire coils, suspended above my

(Continued on page 53)

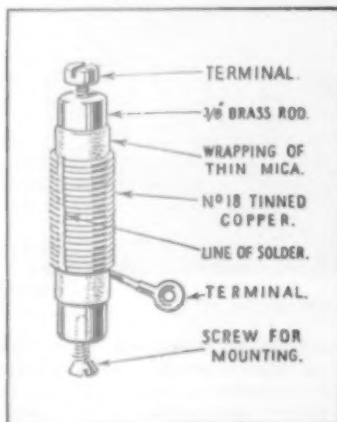
*See page 26 August, 1923, QST.

Strays

When using the Hartley circuit, a variable condenser connected between the grid and filament taps at the inductance will aid in keeping the plates cool and will steady the wave. If trouble is had in finding the correct adjustment, vary the filament clip on the inductance until the best antenna current is obtained before adjusting the condenser.

"TU" of 8BEK.

An excellent grid condenser can be easily built up by wrapping a short piece of brass rod with mica and winding on



a layer of bare copper wire. A little solder run along the turns of wire will hold the winding in position. The capacity of course depends upon the number of turns and the thickness of mica used.

—Wireless World & Radio Rev.

A Change in QST's Staff

F. C. Beekley, formerly assistant purchasing agent of the Whitlock Coil Pipe Co., of Hartford, has accepted the position on QST's staff of assistant editor in charge of production, succeeding Willard B. Cowles, who resigned recently to become Associate Educational Director of the Hartford Y.M.C.A. We are sorry to lose Cowles, as our association with him at QST Factory has been a most pleasant one. Beekley is an old time amateur,

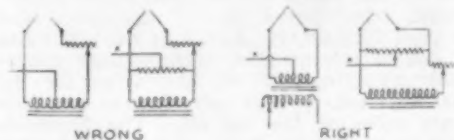
pre-war 3JS and post-war 1WC. With his capable assistance we still look forward to the day when QST will be out ahead of schedule!

The Horne Electric and Mfg. Co., Mercer and Colgate Streets, Jersey City, N. J., has brought out a small step-down transformer in a neat black enameled case designed for lighting the filaments of receiving tubes from A.C. supply. With such a unit the filaments of both radio and audio amplifiers may be heated but it is not advisable to use it for the detector tube.

Erratum: The Landon brothers, 8VN, have called our attention to an error in the last paragraph of their article on page 23 of the June QST. The first sentence should read, "The radiation resistance varies directly as the square of the antenna height and inversely as the square of the wave length."

When Is a Center Tap Not a Center Tap?

Here are a few right and wrong methods of obtaining the "center tap," so necessary in transmitting sets, and more particularly in receiving sets utilizing A.C. to heat the filaments. In the latter case it is absolutely necessary that the center tap be exactly located in order to prevent any



A.C. voltages from getting on the grid of the tube. In transmitting circuits, the resistance shown across the winding in the diagram is replaced by two condensers of equal capacity, usually in the neighborhood of about .003 microfarads each.

Got any ideas for QST covers, fellers?

Anybody know the QRA of AF2 and AC2?

We have had several complaints re-

garding harmonics from Class B broadcasting stations. Under the new regulations Class B stations are not supposed to have harmonics. We would like to hear from the gang regarding this.

F. C. Estey, formerly sales manager of the Clapp-Eastham Co. and a well known New England amateur, is now president of the National Chelsea Radio Corp'n, a newly formed merchandizing concern marketing Chelsea radio products. The new company is specializing in a complete line of moulded parts, although three licensed regenerative sets will be placed on the market soon.

5ZAK on 50-watt phone has been copied off Uruguay by the operator on the S. S. American Legion. The distance is 5300 statute miles. Sum DX! Practically all over the high mountains of Central and South America too. Can anyone beat it?

Among the first group of stations to be heard in Australia during the recent transpacific tests was 6CGM, a station in Sebastopol, Calif., using a lone five-watt tube. Hartley circuit was used; 500 volts on the plate; one ampere in the antenna. FB, OM.

6EN is still treating 'em rough. Putting 1000 mils on 2 fifties at 3750 volts and squeezing 17 amps. into the antenna.

6TQ of Honolulu has arranged two-way tests with Mr. MacLurcan of Sydney, Australia. If successful we will have a relay route to Australia pretty soon.

THE OPERATING DEPARTMENT

(Concluded from page 44)

from here this month. 5AEC and 5OG are new A.R.R.L. stations. New Kirk: 5AMV is a new A.R.R.L. station here putting this place on the amateur relay routes. Enid: 5ANC leads here with 58 messages. 5ZM remarks "QRN don't bother so much if a fellow isn't too darn particular." He comes in second with 43. 5ANC, 5ANF, and 5SR are new A.R.R.L. stations in Enid. Edmond: 5LB has been to the Oklahoma National Guard Encampment, but will have a C.W. set going soon.

Dist. No. 2: Sand Springs: 5GJ's message traffic falls off slightly. QRN and absence of the "rubber stamp" type is the cause. 5XBF was in Ft. Sill two weeks, but managed to move 12 before leaving. Tulsa: The operator of 5WK has joined the Navy. 5GA seems to have handled the bulk of the traffic. 5SG is rebuilding and will be on the air soon. Muskogee: 5BM reports a brand-new OW operator at his station. He is trying to rebuild and be back on the air by September.

Dist. No. 3: Ada: 5AFU is the only station reporting in this district. (Too much QRN, local and otherwise.)

Dist. No. 4: Ardmore: 5AAH is moving to the 9th district. (Sorry to lose you OM.—Art.) 5FM, it looks like its up to you to take care of Ardmore now. How? Ringling: 5AGZ, Carmon Harris, places this place in the relay game. Norman: 5FM just returned from Ft. Sill O.N.G. Camp. Randlett: 5AGW is a new A.R.R.L. station at this point, establishing it as an A.R.R.L.

relay point. Hobart: 5GO, Roland W. Bush, has moved here from Greenville, Texas, and places Hobart among the amateur relay stations. A 5-wattier will do the trick. Altus: 5AHD is taking care of traffic here, moving 44. He is putting up a new mast, then watch his smoke. Lawton: 5DS has moved to 811 A. Ave. His transmitter is out commission. 5ACC wants a schedule with Oklahoma City. He is on any time except 4:00 to 6:00 P.M. and 8:00 to 10:30 P.M., with $\frac{1}{4}$ K.W. spark and 5 watts of C.W.

NEW MEXICO—Alamogordo: 5AKZ is moving to Corpus Christi, Texas. 5LG has been having trouble getting his set to go on a new aerial. He is OK now and reports one message. Roswell: Too much vacation for 5ADO and 5ZA. 5ADO handled 8. "Mucho QRN."

MEXICO—"BX" handled 36 messages with the states. He is still QSO with 5MT every morning and 5VO when he is on. ND in the evening; QRN so very bad. Operating hours are from 5:30 to 6:00 A.M., M.S.T.

THE NEW REGS

(Concluded from page 35)

It should be particularly noted, by the way, that the quiet hours are specified in local standard time. This means that if your community has adopted Daylight Saving Time you may operate up to 9:00 P.M. "daylight time," and then QRX until the night trick at 11:30.

Then, too, the new regulation giving us a frequency band instead of a specific wave-length has been seized with quick appreciation almost everywhere. A great many stations are erecting new aerials to "get down" and many stations working below 200 meters report excellent DX. Inquiries on antenna construction are flooding our Information Service—the fellows are working like beavers to get under the wire before the good weather opens up. We've got a line on a chap who has developed a system for shifting wave-length quickly and accurately and efficiently with but a single control, and we're hot after him for the story for QST.

It's going to be a great winter, and the new regulations promise to contribute much to our enjoyment of it.

INTERNATIONAL AMATEUR RADIO

(Continued from page 51)

A.R.R.L. and B.W.R.L. (British Wireless Relay League) certificates, are series resistances for the generator. Note photos of 5ZA, 8BEO, 1CMK, and 1BES on the wall. There are more cards to the right. I have heard 60 U.S. amateurs with 5ZA the best, and 8 U.S. broadcasting stations."

The Club of 8's

It's the eighth district gang, of course. Not in this country, however, but in France. Over there all of the amateurs' calls begin with the figure 8, hence "The Club of 8's" was chosen as the name of the organization of all of the licensed amateurs in France.

(Concluded on page 58)



Keeping Up the Interest in Your Club

By 2CRO

IN Bergen county, New Jersey, there are several amateur radio clubs which have retained a good hold upon their members, and are of real use to the radio amateur. Among these clubs may be numbered the Hackensack and the Ridgefield Park Radio Clubs. Both are mentioned for the reason that the R. P. R. C. is affiliated with the Hackensack Radio Club and in this manner many activities have been carried out to a successful conclusion, with the aid of both clubs. Despite the fact that these clubs are situated several miles apart and a river intervenes between the respective meeting places, the two clubs got together on several occasions and put across many good-sized affairs. Whenever time and distance permit, clubs in neighboring localities should get together and create a strong feeling of good-fellowship and brotherhood between themselves.

Our idea works out as follows: Any member of either club is welcome at the meetings of both clubs and is allowed all privileges of membership. In this manner both clubs profit, by the fact that all problems are met with the aid and advice of all amateurs in the locality. Traffic conditions benefit also, in that the amateurs in this section of the county get to know each other, and therefore refrain from doing things on the air that they would not hesitate to do were they strangers to each other—such things as excessive testing, long calling, hogging the ether, and many other little odds and ends of the QRM business.

The two clubs have held various social affairs and in all cases everything went serenely and smoothly. Whenever one club has held a banquet or get-together, the members of both clubs have endeavored to make it a success. This point should be clearly apparent to any club especially when it has another club help to sell tickets and spread the news for some event that is to take place at its meetings. When two clubs pull together, in such a manner, you can be sure that amateur radio is getting a big boost in that locality and that the interest of the members, in their respective clubs, is at a white heat. Such

arrangements help both clubs to get prominent speakers by assuring them of large audiences.

While the above plan helps to keep members interested in their club, still there are several methods employed by the R.P.R.C. to keep up the interest in its own club meetings. One "sure-fire" method is to form a good and snappy orchestra. No matter how little or how big such an orchestra may be, it will be found that any social get-together will be greatly enlivened by it. A practice is made, however, of keeping the rest of the members away from the orchestra when it is having practice—else our faith in it would be sadly shattered.

Another method of promoting interest in the club's meeting is to have an auction of old apparatus which the members donate for the purpose. The stuff is sold piece by piece and the proceeds go into the club's treasury. In this manner the treasury is given an amazing amount of stimulus, and the members are enabled to purchase odds and ends for their operating room at very low prices. The beauty of this plan is quite apparent when the treasury total goes up several dollars each meeting.

An annual dinner is held at some member's home. At this dinner the orchestra comes into prominent use, and absurd games are indulged in such as driving a peanut across the floor with the nose. During the year several such affairs are carried out on a smaller scale. The best part of this plan is that the members have a good feed at the club's expense. Hi!

A club to be a real amateur radio club must have done something for our organization, the A.R.R.L., and therefore, it may not be amiss to give an account of what the Ridgefield Park Radio Club has done for amateur radio. Least of all it has purchased a wavemeter for the use of anyone in the vicinity. Then it has adopted "quiet hours" and has enforced their observance by its members. It has held the interest of its members in things pertaining to radio. All this any club, worthy of the name, has already done.

(Continued on page 58)

The Junior Operator

Elementary Radio Principles—II.

The Fourth of a Series of Articles of Helpfulness and Practical Value to Those Just Entering the Amateur Radio Game

By H. F. Mason, Department Editor

Capacity

A condenser, as we ordinarily think of it, is made of two conducting plates or two sets of conducting plates separated by an insulating material of uniform thickness called the *dielectric*. Every condenser has the quality of allowing a limited quantity of electricity to be stored in it. This is called its *capacity* and is expressed in *farads*. A farad is too large a unit to use conveniently so the *microfarad*, which is one millionth of a farad, has been adopted.

The capacity of a condenser depends upon three things: the area of the plates, the distance between the plates, and the material of the dielectric.

How the material of the dielectric affects the capacity of a condenser may be explained in the following manner. A condenser having two plates, say one eighth of an inch apart, with air as a dielectric, is built and its capacity measured. If then a piece of glass one eighth of an inch thick is slipped between the plates the capacity of the condenser will become 7 or 8 times as great. In the following table the effect of some other good insulating materials on the capacity of a condenser is shown. An air dielectric is taken as a basis and the figures in the right hand column show the number of times the capacity is increased when other dielectrics are used. This figure is called the *dielectric constant*.

Dielectric Constants

Material	Dielectric constant
Air	1.0
Glass	4 to 10
Mica	4 to 8
Hard Rubber	2 to 4
Dry paper	1.5 to 3.0

Construction

When designing a condenser for a certain capacity decide upon the material of the dielectric and its thickness first. It must be a good insulating material and must be thick enough to stand the voltage to which the condenser will be subjected, without puncture. When these two things

have been decided the area of plates required to give the desired capacity can be calculated by means of the following formula:

$$A = \frac{1,000,000 \times C \times T}{.03477 \times K} \quad (8)$$

where

A = required area in square inches (one side) of all the dielectric actually between the plates.

C = desired capacity in microfarads.

T = thickness of the dielectric in fractions of an inch.

K = dielectric constant taken from the table above.

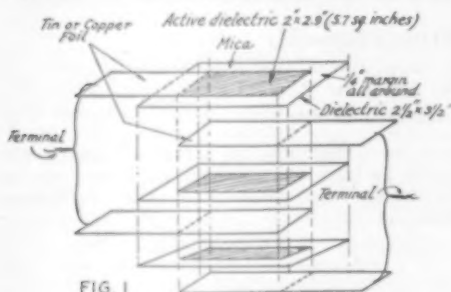
Example: An amateur desires to build a plate stopping condenser for his C.W. set. It should have a capacity of .003 microfarads, and should be capable of standing 750 volts. What dimensions should it have?

Solution: Mica is the most satisfactory insulating material for use in such a condenser. A thickness of at least two thousandths of an inch per thousand volts should be used. To allow for any overloads or variations in the mica, and to allow a reasonable factor of safety, mica of three or four thousandths of an inch thick should be used. If no micrometer is handy for measuring the thickness, several pieces of it may be stacked up and the thickness of one piece estimated with fair accuracy. Let us say that the mica we are going to use is four thousandths (.004) of an inch thick. The dielectric constant of mica from the above table may be taken as 6. The desired capacity is .003 microfarads. Substituting these values in the above formula we have

$$A = \frac{1,000,000 \times .003 \times .004}{.03477 \times 6} = 57.7 \text{ sq. in.}$$

This means that the total area of active dielectric, that is, the area of dielectric actually having a conducting plate on each side, must be 57.7 square inches. This is divided between a number of small plates

of mica as shown in Fig. 1. In this case, ten pieces of mica will be necessary because each has an active area of 5.7 square inches. Only a few pieces are shown in the figure. A margin of at least $\frac{1}{4}$ of an inch (for a 1,000-volt condenser) is left around the active area for insulation. Alternate pieces of the tin or copper foil extend beyond the mica and are connected together as shown, forming the two ter-



minals. When the condenser is assembled in this manner it should be tightly clamped between two pieces of insulating material. More definite constructional details for fixed condensers for C.W. transmitters will be given in a later article.

Condensers in Series and Parallel

When several condensers are connected in parallel, the capacity of the combination will equal the sum of the individual capacities.

If several condensers are connected in series they will act like a single condenser having a dielectric as thick as that of the individual condensers combined. In this way the capacity of four equal condensers in series will be one fourth that of one. When condensers having unequal capacities are connected in series the capacity of the combination can be figured in the same manner that the total resistance of several resistances in parallel was found in last month's article. (See pages 61-62, August QST.*) It will be equal to the reciprocal of the sum of the reciprocals of the separate capacities.

The voltage that several equal condensers in series will safely stand is as many times greater than the voltage for one as there are condensers in the series. Advantage of this is often taken in building mica condensers for high voltages. Using this principle a .004 microfarad condenser to stand 20,000 volts can be made of twenty 1,000-volt sections of .08 microfarad each, all connected in series.

The Effect of Frequency

Alternating currents of different frequencies do not flow with the same ease in a circuit containing a condenser. In

order to see the cause for this it will be well to explain the manner in which current flows in a circuit containing a condenser. It is contrary to the laws of direct currents that electricity should flow through an insulator, yet that is what apparently occurs in a condenser. Why?

Refer to Fig. 2. When the switch is closed the current from the battery will momentarily rush to the plates of the condenser. One plate will acquire a positive charge and the other a negative charge. The moment the condenser becomes charged, however, a sort of elastic reaction or bucking effect will appear in the condenser. This is in opposite direction to the charging potential and will build up equal to it, thus completely stopping the sudden rush of current that occurred when the switch was first closed.

Even though no current flowed through the condenser, as we usually speak of current flowing, there was a momentary rush of current that charged the condenser, the effect of which can be thought of as being the same as if a flow of current had actually occurred. This rush of current is called a *displacement current* and occurs whenever there is a change in potential in a circuit containing capacity.

If some sort of an instrument that would indicate the average displacement current flowing were connected in a cir-

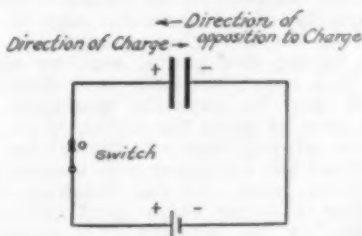


FIG. 2

cuit containing a condenser, and alternating current were to flow in the circuit, it would seem that the greater the frequency and the faster conditions in the circuit changed, the greater would be the average current. That is exactly what happens. Rapidly alternating currents of radio frequency cause greater displacement currents than do slowly alternating currents. This is why the effect of capacity anywhere in a circuit containing radio frequency current is so great.

Electro-Magnetic Induction

With the aid of Fig. 3 the phenomenon of electro-magnetic induction may be explained. To begin with there is always an electro-magnetic field around a wire carrying a current. In order to concentrate the field, the wire is wound in a coil of one or

*Can be obtained from the QST Circulation Dept. at the regular price.

another of the various common shapes. The strength of the field will increase as more turns of wire are added to the coil.

Referring to the figure, when the switch is closed an electro-magnetic field of force will suddenly be built up around the coil as shown by the dotted lines, remaining as long as the current flows. When the switch is opened this field will collapse and disappear almost instantly.

From this action it is not hard to understand that if a flow of current, which represents a transfer of energy, is capable of producing an electro-magnetic field, so should the change or disappearance of this field be capable of causing a current to flow in any nearby conductor, transferring energy back to the circuit. In this way the field produced by a current will actual-

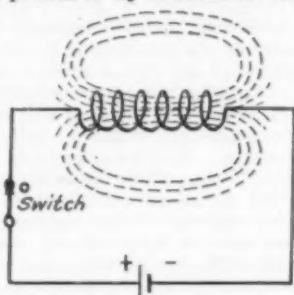


FIG. 3

ly tend to cause a current to flow through the same circuit in the reverse direction. This tendency will of course cut down the total current flowing.

This property of a circuit, by virtue of which it opposes changes in the current, is called its *inductance*. The unit of inductance is the *henry*, but like the farad, it is a unit too large for use when dealing with radio frequency circuits. The *microhenry*, one millionth of a henry, is the unit generally used.

It should be remembered, however, that the phenomenon of inductance appears only when the current through a circuit is changing. It is, therefore, a term used principally in connection with alternating currents. As the frequency of the alternating current increases, and the changes occur more rapidly, the opposition to the flow of current will increase and the total current will decrease. It follows, then, that alternating currents of high frequency will not flow through an inductance as easily as currents of low frequency.

Calculation of Inductance

The inductance of a coil depends upon the dimensions and number of turns in the coil, growing larger as these figures are increased. Inductances are wound in many different styles and sizes, depending upon the space available, the current that they

are designed to carry, the frequency of the current, and the use to which they are to be put. Formulas have been worked out for the calculation of the inductance of various kinds of coils from their physical dimensions, but for all except the plain single-layered winding they become quite complicated. The formula for finding the inductance of a single-layered coil is given below.

$$L = \frac{.1558 \times A^2 \times N^2 \times K}{B} \quad (9)$$

where

A = radius of the coil in inches, measured from the center axis to the center of any wire.

B = length of the coil in inches, from center to center of the outside turns.

N = number of turns of wire in the coil.

K = a constant, depending upon the ratio of diameter to length (from table below).

L = inductance in microhenries.

Example: What is the inductance of a single-layered coil of 15 turns of No. 16 D.C.C. wire, the winding being four inches in diameter and 1.1 inches long.

Solution: The first step is to find the correct value of K from the table. The diameter, 4, divided by the length, 1.1, equals a little over 3.6. This gives, from the table, a value of approximately .3882 for K. Substituting these values in the above formula the solution will be as follows:

$$L = \frac{.1558 \times 4 \times 225 \times .3882}{1.1} = 49.5 \text{ microhenries.}$$

Values of K for Use in Calculating Inductance

Diameter Length	K	Diameter Length	K
.2	.9201	3.2	.4145
.4	.8499	3.4	.4008
.6	.7885	3.6	.3882
.8	.7351	3.8	.3764
1.0	.6884	4.0	.3654
1.2	.6475	4.2	.3551
1.4	.6115	4.4	.3455
1.6	.5795	4.6	.3364
1.8	.5511	4.8	.3279
2.0	.5255	5.0	.3198
2.2	.5025	5.2	.3122
2.4	.4816	5.4	.3050
2.6	.4626	5.6	.2981
2.8	.4452	5.8	.2916
3.0	.4292	6.0	.2854

Resonance and Tuning

Take two similar glasses, preferably thin-stemmed wineglasses, pour a small amount of water in each, and they will ring out with the same note when struck lightly with a pencil. If there is a slight variation, water can be added in the glass that has too low a tone until both sound alike. Now, if one is struck a smart tap and the hand is placed over it to stop the vibrations, the other glass will be heard ringing. Both glasses have been adjusted to the same tone

and therefore one responds to the other. The two glasses are now said to be in *resonance*; or in *tune*, to use the radio term. If water is added or taken away from either glass, so that the tone is distinctly different, the glasses will be out of tune and there will be no response from the other when one is tapped.

A very similar action takes place in radio circuits. Any circuit containing inductance and capacity (provided that it does not have too much resistance) will respond to alternating currents of a certain frequency, just as the glasses responded to sound waves of a certain frequency or tone. Fig. 4 shows such a circuit. Instead of varying the amount of water in the glasses, we vary the amount of inductance and capacity until the *resonant frequency* is found. That is what we do when we turn the dials of the variable condensers, variometers, or switches in a receiving set. We vary either the inductance or capacity in a circuit until the receiver becomes *tuned to resonance* with the transmitter.

The values of inductance and capacity required for a circuit as in Fig. 4 to re-

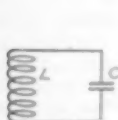


FIG. 4

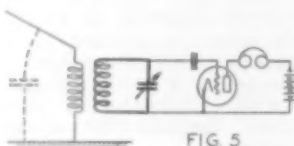


FIG. 5

spond to a predetermined wave length may be calculated beforehand by means of the following formula.

$$\lambda = 1884 \sqrt{L \times C} \quad (10)$$

in which

λ (the Greek letter *lambda*) = the wave length to which the circuit is resonant.

L = inductance of the circuit in microhenries.

C = capacity of the circuit in microfarads.

Example: Let us say that the coil, whose inductance we found a few paragraphs above to be 49.5 microhenries, is to be used as the secondary coil of a variocoupler in the receiving diagram shown in Fig. 5. A variable condenser having a maximum capacity of .0005 microfarads is connected across it. What is the highest wave length to which the set will tune? (Note the similarity between Fig. 4 and the heavy lines in Fig. 5.)

Solution: We have only to substitute the values of inductance and capacity given above to find the wave length to which the circuit will tune. However, it will be noted that the grid condenser and the tube are also connected to the circuit. The filament and grid of the tube act as a small condenser, and that, in series with the grid condenser, will add to the capacity in the

tuned circuit slightly. This, however, can be neglected unless extreme accuracy is desired.

Substituting in the above formula

$$\lambda = 1884 \sqrt{49.5 \times .0005} = 296 \text{ meters.}$$

Throughout radio, in both transmitting and receiving circuits, tuned resonant circuits are employed. In each case the wave length to which the circuit will respond can either be calculated, or for better accuracy, measured with a good wavemeter. Sometimes there are many inductances and capacities in the circuit but the principle is the same.

(Continued next month)

INTERNATIONAL AMATEUR RADIO

(Concluded from page 53)

The principles upon which it is founded are closely parallel to those of our A.R.R.L., namely: 1. To regulate amateur transmission to avoid interference and confusion. 2. To organize conventions and meetings as in America. 3. To cooperate with the governmental and other laboratories in research work on short wave lengths. 4. To protect the interests of its members. 5. To police the air on short waves and aid in preventing unlicensed transmissions. 6. To organize a society for the exchange of ideas, papers, and apparatus. 7. To bind together, in a friendly bond, the transmitting amateurs of allied and friendly foreign countries.

Although the "Club of 8's" is only a little over six months old, it is going right ahead in great style, has adopted *La T.S.F. Moderne* as its official organ, and promises to be the liveliest radio amateur organization in Europe.

WITH THE AFFILIATED CLUBS

(Continued from page 54)

We have, however, one more achievement to our record: The R.P.R.C. saw the need for a bigger and more influential organization of the amateurs in Bergen county. In April we held a joint debate with the Hackensack Radio Club. We had an attendance of nearly every amateur, worthy of the name, who resided in Bergen county. Seeing the need for a county organization, we put the proposition up to the men present and asked them to think it over. Then, by means of careful inquiries over the air, we ascertained that the idea was acceptable to the majority—in fact there were no contrary-minded men to be found. Acting on this information the Hackensack Radio Club then offered to procure a meeting place and arrange the details. The R.P.R.C. took care of the publicity. In May the first meeting

(Concluded on page 61)

Deliberate Interference

—A Story by Erald A. Schivo—

"MEMBERS of the San Francisco Spark Club against John Mullen!", intoned the voice of the club's secretary with all the solemnity and importance of a common-law court clerk. "John Mullen, you are—um—arraigned for violating the statutes of this Club; first by transmitting with a powerful spark during the quiet hours; and, second, by transmitting profane language. If it be your wish to challenge any talesman, you may do so."

The clerk looked belligerently at the defendant's attorney, half expecting to see the man rise to his feet and loudly question one of the twelve jurors. Instead, Mr. Underwood, a young college student, smiled with such friendliness towards the jurymen that the double row of them could not help but smile in return.

The reader perhaps has not heard of the "San Francisco Spark Club." If such be the case he will wonder why a radio amateur should be brought before the bar of justice for so trivial an offense, it may seem, as interfering with a broadcaster.

This scene is enacted in the meeting room of the club. Almost every radio man in San Francisco is a member, to say nothing of a few hundred from other cities in the vicinity. Imagine, therefore, the audience! No outsiders were allowed at the trials; the jurymen were selected from the large membership roll. They had seated themselves in a roped-off section to the left of the platform on which presided the club's president as judge. He had made certain that there was sufficient space to swing the gavel; during the last trial no one seemed able to hear it. At the right was seated the defendant, John Mullen, with his attorney, Herbert Underwood. Near them was the court clerk Forsythe, and the club's prosecuting attorney.

Mullen's trial would be the third. At each of the preceding trials the defendant had been found guilty. The judge had made the fine twenty-five dollars, the sum every member must deposit with the treasurer when initiated into the club. They had not been expelled, but had deposited another twenty-five dollars and continued as members, because a radio amateur not a member of the "S.F.S.C." was ignored by almost every other amateur in the city. Non-members might transmit to each other, but the popular feeling against them was so strong, and the power of the club so great, that such men were bound to be exterminated.

Prosecuting Attorney Forsythe started to

do his duty. The defendant, he told the jury, had been heard transmitting with high power while a radio broadcaster had the only privilege to send. Not only that, but the defendant had used profane language. When the broadcaster had told him to stop interfering, the language gained vocabulary. The prosecution would now call the first witness; "Mr. Scott."

Scott, a young fellow, somewhat ill-at-ease, took the witness chair. He told how he happened to be listening in when he heard Mullen interfere with the broadcaster. Mullen had called a distant sta-



"Put on the headset and throw the antenna switch—"

tion, and, failing to receive an answer, had used profanity. When the broadcast station requested Mullen to stop, he had only used stronger language.

The eyes of the audience glared at Mullen as if he were a great criminal. But look!! What was the matter with the man? There were periods when he closed his eyes and appeared not to hear a word that the witness was saying. And there were times when he almost fell over in his chair. A few came to the conclusion that the young man needed sleep, while others thought that he was certainly drunk.

After Scott had finished testifying for the club he was cross-examined by Underwood.

"Are you positive that it was the defendant's spark you heard?"

"I am!"

"How can you be so positive?"

"Because his tone is unlike any other."
"What leads you to think that it was Mullen who was transmitting?"
"Nothing, except that it was his spark."
"You are not mistaken about the time?"
"No! It was eight o'clock."
"That's all." And Scott was glad to leave the witness stand.

The next witness for the club corroborated all of Scott's testimony. Two other witnesses were called by the club, one being the operator of the broadcasting station. The defendant's attorney waved the first witness aside and questioned only the broadcaster.

"When did you first hear the spark which you say came from the defendant's station?"

"When he began to transmit; about 8 o'clock."

"Did you immediately call the interfering station and instruct the operator to stop sending?"

"No; I waited until he had called a long-distance station, thinking that perhaps he had something important. But after failing to get the station called he began to use language seldom heard with a wireless receiver. Then I told him to stop."

"Did he give any sign that he had heard you?"

"Well—no, unless his language may be taken as ev—"

"Forget his language! How long did he continue transmitting after that?"

"About five minutes."

"That will be all." The broadcaster left the stand.

Prosecuting Attorney Forsythe laughed openly at Underwood. Mullen's trial now seemed an open-and-shut case. The prosecution was finished and, "The club rests!", sang out Forsythe.

The jury looked to the defense. All were aware that the only witness Underwood could put on the stand was Mullen, the accused. Everyone looked toward the accused. At the beginning of the trial many thought him a little intoxicated; he now appeared more drowsy than anything else. The jurymen were puzzled.

"Take the stand, Mr. Mullen," directed Underwood.

With difficulty Mullen rose to his feet. He looked about him, tried to gain control of himself, and then tottered to the stand and dropped clumsily into the witness chair with a heavy sigh of relief.

Underwood asked—"What kind of a spark-gap do you use, Mr. Mullen?"

"Rotary quenched," said Mullen, slowly.

If someone were to use your transmitter while you were asleep it would not awaken you?"

"Your Honor? I object!" cried Forsythe. "A very good question," His Honor decided. "Answer it."

"Although my set is in the room next to where I sleep I would not hear it."

"Mr. Mullen," said Underwood smilingly, "where were you one week ago to-day at eight o'clock?"

"If you mean the night when someone interfered with the broadcasts, I was in bed."

"Is it customary for you to go to bed so early?"

"No; but that night I retired early because I had been very busy for several days—had no sleep for forty-eight hours."

"That's all." Underwood turned to Forsythe—"Your witness."

As Mullen met Forsythe's hungry eyes the club attorney knew that a little doubt still rested upon the jury's minds as to whether Mullen was guilty or not. They might recommend that the defendant be fined less than twenty-five dollars. Forsythe did not like to leave the subject, because he must remove the last doubt as to the defendant's guilt. An opportunity to prosecute a man did not come to Forsythe every day. Wondering why Underwood had not made any more of an attempt to defend Mullen he began:

"You say that your spark-gap is a rotary quenched?"

"Yes."

"How far can a person hear your gap?"

"What's that?"

"I asked the distance from which your spark can be heard."

"Oh! In the next room. With the door closed the spark can't be heard—but—the—motor—can." Mullen was getting drowsier every moment.

"No one saw you go to bed at eight o'clock?"

"What's that?"

"Are you hard of hearing? This will make the seventh time I have had to repeat! I asked if anyone had seen you go to bed at 8 o'clock."

"No—no."

"If there are no objections I would like to have you tell the jury why you are so busy that you occasionally go without sleep for forty-eight hours."

"I—I—what—did you ask?"

Forsythe grew purple in the face.

"When did you sleep last!?", he roared.

"Didn't have any sleep for three days—three days," mumbled Mullen.

"You didn't hear any sound last Saturday night which might have awakened you?"

But there was no sound from John Mullen. He was sound asleep in the witness-chair.

A little murmur came from the audience.

"Wake him," ordered the president.

It could not be done. Shaking, rubbing his face, pulling his hair, nothing could make Mullen open his eyes. Everyone sat back and stared in consternation.

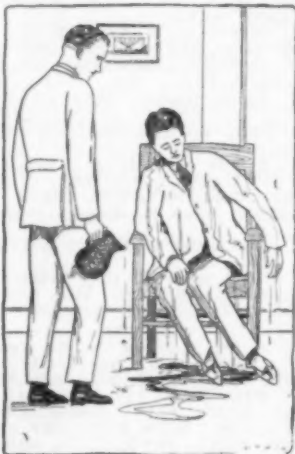
Suddenly Mullen moaned faintly and sat up. His eyes were wide open and staring, as he rose from the chair and walked toward the club's big tube transmitter. The jurymen gazed in bewilderment as they saw Mullen fumblingly put on the headset and throw the antenna switch. In the dead silence the hum of the plate-power transformer could be heard all over the room as Mullen began calling an unheard-of station. He finished and listened. Then he sent out some unintelligible language. Then he mechanically turned off both the

less set be cut off at night and his father be given the key to the radio room."

The approving murmur of the audience disappeared in the scrape of chairs and the hum of voices as everyone made ready to go.

Forsythe stopped Underwood in the hall and whispered in his ear. "Clever game, O.M.! I could never have convinced the jury that it was all acting. You'll make a good lawyer with such tricks up your sleeve."

Underwood grinned. "Maybe Mullen will make the club a present of twenty-five dollars. In fact I know he will."



"Mullen stirred drowsily—"

sending and receiving sets, slowly replaced the headset on the table and as slowly went back to his chair.

As he seated himself there was silence in the entire hall except for his deep breathing.

Minutes passed.

"I think a little water will be about right now," ventured the president.

Attorney Forsythe reached for the granite pitcher and poured a quart of ice-cold water over the sleeping Mullen. Mullen stirred drowsily and finally opened his eyes.

"What was that question?" he asked.

"Say—say, how did I get wet?"

"Let that go for a while," instructed Forsythe. "Do you ever walk in your sleep?"

"Not that I know of."

"That's all. The club rests."

Mullen walked from the witness chair to his seat, feeling his wet clothes wonderingly.

.....

The foreman of the jury was speaking. "Mr. Mullen has been found not guilty but we advise that the current to his wire-

WITH THE AFFILIATED CLUBS

(Concluded from page 58)

of the Bergen County Radio Association was held. 2AKO presided at this meeting and called for an expression of opinions from those present. Representatives from the various towns and clubs voiced their approval and as a result a committee was appointed to draw up the by-laws, etc. Due to the hot weather and the usual summer slump, nothing further has been done, but it is a positive fact that the Ridgefield Park Radio Club will not rest until the Bergen County radio men have made the Bergen County Radio Association an active factor in the Second District.

The writer has not attempted to show how to run a radio club; on the other hand, he has only given a brief account of the activities of the Ridgefield Park Radio Club in the hope that it may serve as a source of ideas and hints to other clubs.



Calls Heard



HEARD DURING JULY Unless Otherwise Specified

When preparing a list for QST, please observe the following rules:

1. List the calls on a separate sheet of paper; do not embody them in a letter.
2. Arrange the calls as they will appear in QST: across the page, numerically by districts, alphabetically in each district, Canadian and foreign calls listed separately, state whether spark or C.W., and give period of time covered by the list.
3. Forms close on the fifth of the month preceding the date of issue of QST. Make your lists cover the period from the first of one month to the first of the next if possible, but don't let your list come in late.
4. List only calls over 1,000 miles distant.

F. D. Bell, New Zealand. Calls heard to date. (88)

1AJJP, 1KC, 2BRB, 2CBW, 3CL, 3YO, 3AB, 4HW, 4MY, 4FT, 5PX, 5ZB, 5XAJ, 5ZAK, 5GA, 5SK, 6ZG, 6ZR, 6GD, 6BG, 6FH, 6GF, 6BV, 6BM, (6IF, -6CGW), 6JD, 6RM, 6CN, 6AJJ, 6ARB, 6ALK, 6APW, 6AVN, 6AWT, 6AWX, 6AWQ, 6BNT, 6BET, 6BWP, 6BVG, 6BED, 6BJQ, 6ZU, 6AHU, 6AAK, 6BBC, 6BIC, 6ABX, 6CBL, 6KBC, 6KA, 6BEO, 6CKR, 6BAW, 6CEI, 6BVS, 6AAU, 6PL, 6BEG, 6AOI, 7AW, 7BJ, 7BX, 7PF, 7ZF, 7SC, 7FO, 8QK, 8AIO, 8BCI, 8ER, 8CH, 9MC, 9UM, 9UR, 9UU, 9ZT, 9AUL, 9AYU, 9APW, 9CUD, 9DGW, 9CVO, 9AAU, 9DPX, 9AIM, 9BEO.

My best night was last Sunday, July 1st, which was late on Saturday night in the U.S.A. I listened for two hours on around 200 meters and logged 39 calls from 17 different transmitters! The extraordinary thing is that they hailed from every district in the U.S.A.! A pure fluke, of course, but here is a copy of my log. The only one I'm not real certain of is 3AB—I fancy he is a Canadian.

Extract from Log Book. Sunday, July 1st.

(All time is N.Z.T., 11½ hours ahead of G.M.T.)

6:20 P.M. 6BIC to (?); 21, 4FT to CQ; 22, 9AIM to CQ; 23, 6KA to CQ; 30, 9AIM to 9CP; 37, 6KA to 9ANK (?); 40, 6BIC to CQ; 42, 4FT to (?); 45, 6BIC to (?); 46, 6KA to (?); 51, 4FT to CQ; 52, 6AOI to CQ; 53, 6RM to 9ZT; 55, 6AOI to (?).

Interval for meal.

7:24 P.M. 7FO to (?); 35, 2BRB to CQ; 40, 2BRB to CQ; 45, 5GA to 9AXT; 46, 2CBW to CQ; 48, 2BRB to "3" stn; 49, 5GA to "9" stn; 50, 2CBW to 9ZT; 51, 9AIM to 9BAK; 52, 8BCI, to "9" stn; 59, 1KC to CQ.

8:02 P.M. 2CBW to 9DIS; 04, 2CBW to 9DIS; 07, 9AIM to CQ; 09, 5GA to 9BKO; 11, 8BCI to 9APEI; 13, 9ZT to 8GJ; 15, 8ER to CQ; 17, 9BEO to (?); 20, 3AB to (?); 27, 2CBW to 9ARC; 42, 2CBW to 9ARC; 45, 2CBW to (?); 46, 6RM to (?); 47, 8CH to (?).

Transmitters logged, by districts: 1KC, 2BRB, 2CBW, 3AB, 4FT, 5GA, 6BIC, 6KA, 6AOI, 6RM, 7FO, 8ER, 8BCI, 9BEO, 9ZT, 9AIM, total, 17.

Heard at Sea by 5XAD's "GG"

May 11. 400 miles N.E. Savannah: 1AIA, 1ASK, 2CGJ, 2CUI, 2CVS, 3BHL, 3BRW, 3CEQ, 3JY, 3NF, 3SA, 4BX, 5XK.

May 15. 1078 miles E. Sandy Hook; (20 minutes) 1BWJ, 1BQI, 2AER, 2AYV, 2CEL, 6AAU.

May 18. 1750 miles East Sandy Hook; 3APR, 3JJ, 3TJ, 8CUV, 8ZW.

May 19. Azores Islands: 1CXJ, 1BACT, 2CBW, 9CMN.

May 22. Off C. Vincent: 1ES, 1RV, 2EL, 2AWF, 3SU, 8CSJ.

May 23. Straits of Gibraltar: 1SN, 8JY.

July 8. 900 W.S.W. Canary Ids.: 1FD vy QSA, 1BVA, 2CQZ, 3AB, 3BV, 4FT, 9BSG.

July 9. 2093 miles E. Hole-in-the-wall: 1FM, 2FP, 4FT.

July 10. 1811 miles E. Hole-in-the-wall: 2CQZ, 4FT.

July 11. 1543 miles E. Hole-in-the-wall: 1ZE, 2DH, 2CQZ, 2CDK, 2BN, 3SG, 4GL, 8AFU, 8BJH, 9BIK. Can. 1AR.

2CSA at St. Andrews, N. B., Canada (Neutrodyne), July 17-31

C.W.: 4FS, 4GX, 4LJ, 5ADG, 5MO, 5XW, 5AL, 8BF, 8LT, 8OK, 8TH, 8TX, 8VY, 8ZZ, 8ATP, 8BCI, 8BDA, 8BGL, 8BLU, 8BOG, 8CPD, 8CDC, 8CDD, 8CGJ, 8CMU, 8CUR, 8DDC, 9EP, 9UC, 9AOU, 9BAK, 9BLO, 9BNB, 9BYT, 9CUV, 9DEK, 9DGO, 9DRC, WNP(?).

2BIR, Nutley, N. J.

(4AF), 4EB, 4FG, 4FT, 4KU, 4RF, 5KC, 6AH, 9MF, 9MM, 9US, 9ZN, 9ZT, 9AMF, 9APW, 9ARC, 9AUD, 9AUU, 9AW, 9AWG, 9BAF, 9BAK, 9BBG, 9BIK, 9BMU, 9BRK, 9BSG, 9CHG, 9DHQ, 9DIS, 9DLT, 9DSL, 9DSS. Anyone hearing my 50 watts C.W. please QSL via crd.

6CKF, Burlingame, Calif.

(June & July)

7BJ, (7BR), (7CF), 7BG, 7GP, 7IO, 7IS, 7IW, (7KS), 7LR, 7NS, 7NN, 7SE, (7TO), (7TQ), 7WS, 7ABU, 7ADP, 7AFF, 7AFO, (7AFN), 7AGI, 7AGV, 7AHL, 7AIN, 9CAA.

6IV, Riverside, Calif.

(Period not stated)

C.W.: 1RK, 1CKP, 2FP, 2XQ, 3CC, 3ARO, 4CG, 4CL, 4YA, (5BE), 5BM, 5CY, 5DE, 5GG, 5GR, 5HZ, 5JZ, 5KC, 5MN, 5NZ, 5PB, 5PX, 5QI, 5QS, 5SK, 5TC, 5UI, 5UJ, 5VI, 5VO, 5ADB, 5ADO, 5AEC, (5AHD), 5AIB, 5XB, 5XD, 5XV, 5XAB, 5XAD, 5XAJ, (5ZA), 5ZB, 5ZD, 5ZH, 5ZP, 5ZAK, 5ZAS, 5ZAT, (5ZAV), 5ZAW, 5ZAX, 7AK, (7BJ), 7BA, 7BR, (7DC), 7DH, (7DP), (7GE), 7HF, 7HJ, 7IO, 7IY, 7JG, (7JW), 7KJ, 7KS, (7LN), (7LR), 7LU, 7LW, 7MC, (7MY), 7NA, 7NF, (7NN), 7NY, 7OM, 7PF, 7PJ, (7QJ), 7QN, (7QT), 7SC, 7TG, 7TO, (7TQ), 7VE, 7VK, 7WM, (7WS), (7WX), 7ABB, 7ABH, (7ACK), (7ADG), 7ADP, (7AEA), 7AFN, 7AFT, (7AFW), (7AGE), 7AGV, 7AIY, (BT3), 7YA, 7ZB, 7ZF, (7ZN), 7ZO, 7ZR, 7ZU, (7ZV), 8BK, 8CH, 8FT, 8QK, 8UE, 8VY, 8WX, 8APW, 8AQV, 8AWG, 8AZD, 8AZW, 8BCH, 8BEN, 8BOZ, 8BWX, 8BYO, 8CEI, 8CKA, 8CRB, 8CWU, 8XE, 8XAN, 8YD, 8YN, 8ZW, AD7, 9LW, 9LY, 9LZ, 9PI, 9PS, 9RC, 9UH, 9UU, 9VM, 9WD, 9AAP, 9AAU, (9ABC), (9ABU), 9AEY, 9AFK, 9AIX.

(Concluded on page 67)

Radio Communications by the Amateurs

The Publishers of QST assume no responsibility for statements made herein by correspondents



A Simple Speech Amplifier

New York City, N. Y.

Editor, QST:

I have been experimenting with a speech amplifier on my five-watt phone set for the last few weeks and believe the results obtained are worth passing along. The simplicity of this particular arrangement is that no unusual hookup or apparatus is used; it is simply an ordinary audio amplifier, as used in a receiver, with its output controlling the modulator tube. The purpose of the speech amplifier is to increase the percentage of modulation in a set. In

set was increased about four times by the addition of a speech amplifier.

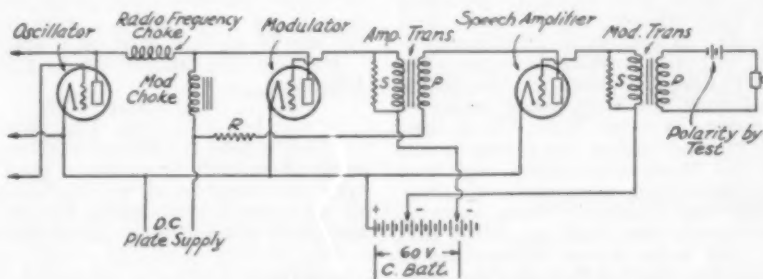
E. C. Wilbur, 2BNL.

Barometric Pressure Affects Radio

Minneapolis, Minn.

Editor, QST:

It has been noted that receiving conditions vary from night to night. The theory which seems to be most logical, and the one that checks with practice, is that radio waves tend to follow isobars, or lines of equal pressure area. They travel better



A SIMPLE SPEECH AMPLIFIER

many cases where the modulator tube is modulated directly, by a microphone connected through a microphone transformer, the percentage of modulation may be quite low, even on a small set.

In a phone set wired for the ordinary Heising modulation circuit, remove the modulation transformer and replace it with a good amplifying transformer having about a four-to-one ratio and a flat amplification curve. The speech amplifier tube may be a UV-201 or UV-202, whichever is handy. The plate voltage on the amplifier tube may be reduced, if necessary, by adding a resistance of about 10,000 ohms at R. The secondaries of both transformers should be shunted by five-megohm grid leaks, which will improve the quality of the speech considerably. The C-battery voltage of both tubes is critical; also the polarity of the microphone battery. If the set howls reverse the primary leads of the amplifying transformer.

I would say that the voice range of my

in low pressure areas than in high pressure areas and will not penetrate high pressure areas. In low pressure areas, reception is very good, and in high pressure areas, receiving results are very poor.

Recently a striking example of these high and low pressure areas occurred. A tornado passed through Louisiana, thus causing a low pressure area to exist there. At that time the northern part of the United States had no disturbance whatever, and was in a high pressure area. Radio fans in Minneapolis heard nothing over 100 miles distant on that night.

Sometimes signals must take a round-about course and follow the isobars, and in that case, marked fading exists. This is due to the fluctuation in pressure existing at the edge of the high pressure area which is in between. On some nights practically the entire United States will have the same barometric pressure and, on those nights, stations from all sides come in. The Mississippi Valley generally has the same baro-

metric pressure through its entire length; thus signals are consistently loud up and down the valley; louder than in an easterly and westerly direction, where barometric differences are greater.

On a Thursday morning the weather map showed a barometric pressure of 29.9 in Minneapolis. On the same morning the barometric pressure at Los Angeles was 29.9, San Francisco Bay, 29.9. Stations worked on that morning included two in the San Francisco Bay district, 6CUI in Los Angeles, 6BPB in Santa Monica, and 6ALK in Fullerton, Calif. No communication occurred to the east of Minneapolis and, upon consulting the weather map for that morning, it was found that the barometric pressure increased all the way to the east, going as high as 30.2 from Detroit to New York.

As another example, we will take the weather map for Tuesday, May 29th. Minneapolis had a barometric pressure of 29.65. The pressure of all of the country to the east of Minneapolis and from Maine to Virginia was the same as that at Minneapolis. That night stations in 15 states within this band were worked, including New York, Massachusetts, New Jersey, and West Virginia. Attempts to establish communication with the west coast were without avail. The weather map for this morning showed that the barometric pressure varied greatly between Minneapolis and the coast. In most places the pressure was quite low, but there were many high and low spots throughout the entire distance.

The writer has continued these observations from time to time, and has found that the theory that radio waves follow lines of equal barometric pressure holds in 90% of all cases when applied to radio communication on short wave lengths. By closely following the weather conditions and weather maps from day to day, receiving conditions for the following night can, in practically every case, be predetermined.

Don C. Wallace, 9ZT.

Why Not?

S. S. Samuel Q. Brown,
Balboa, Canal Zone.

Editor, QST:

We have the Continental code by means of which we transmit information from one operator to another; we have the Underwriters' code which, if obeyed, safeguards our property; we lack one code to complete a trio of useful codes; that is the "A.R.R.L. Code."

The Golden Rule, the radio communication laws of the U. S., the Chicago Plan, the Pacific Plan, all combined are only a means to an end. Some more desirable procedure is necessary for the upholding of the law, the plans and the high ideals of the A.R.R.L. This is the scope of the A.R.R.L. Code.

The first aim of the A.R.R.L. Code is to prevent the members of the A.R.R.L. practicing any principle which would be prejudicial to the welfare of the organization. The first two principles of the A.R.R.L. Code could be taken from the article "On Being An Amateur" by H. F. Mason, which says, "An amateur must not only be a good operator, but should be a good co-operator as well. The amateur must justify himself by adhering to high ideals in radio, both as regards his operation and his technical knowledge."

The A.R.R.L. Code would define amateur conduct (the etiquette of the air). It would be particularly helpful to the younger amateur. It would impress the officials of our government with the seriousness of our purpose, and illustrate it to the broadcast listener. The A.R.R.L. Code would be our code of honor.

The A.I.E.E. in 1912 adopted its code of "Principles of Professional Conduct." Today all national societies of civil, mechanical, electrical, and chemical engineers have a code of conduct. The A.R.R.L. is a national institution as serious in purpose as any of the above mentioned societies and equally as progressive. It is proper that we should have a code of conduct also.

Hoping this suggestion may find favor, I remain,

Cordially,

Ben. B. Skeete.

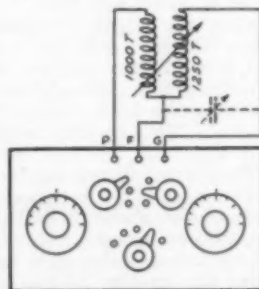
(This is food for thought, fellows. We will be glad to hear from those good amateurs who are capable of writing or of helping to write such a "Code of Honor." Do you not think it would help the old game?—Ed.)

All Waves on a Reinartz Tuner

Houston, Texas.

Editor, QST:

I have been using a Reinartz tuner, such as was described in the March, 1922, QST, for several months. Not being much of a broadcast listener, I have been spending



CONNECTIONS FOR LONG WAVE RECEPTION.

the early evening hours experimenting with honeycomb coils, used on the three load-coil binding posts of the Reinartz tuner.

(The coupling between the two coils should be variable.—Ed.) I find the arrangement entirely practical and the high powered arc stations come through just as well as they ever did on my regular honeycomb set. With these large coils in the circuit, the set acts, in every way, just as it does on 200 meters. I have no trouble in tuning in NSS time signals as well as many other high powered arcs in America, and once, several weeks ago, I succeeded in copying complete, an 85-word news despatch from UFT in France. Subsequent translation showed that the copy was almost perfect. The above reception was accomplished with just the addition of the honeycomb coils and using the condensers in the Reinartz. The drawing shows the arrangement used. If a wider range of wave lengths without changing coils is desired, a .001 microfarad condenser connected across the secondary binding posts will greatly increase the wave length range. For receiving NSS, UFT, and other arcs around 13,000 to 18,000 meters, I used a 1250-turn honeycomb coil for the secondary and a 1000-turn coil in the plate circuit. Proper coils for tuning to other wave lengths may be found by experiment.

With this arrangement, the Reinartz tuner will efficiently cover every wave length in use.

E. L. Lester, 5NK.

Those W. E. Tubes

Montreal, Canada.

Editor, QST:

Noticing in the current issue of QST that an amateur, who evidently knows what is good, wants to know how to pry the Western Electric Company loose from some of their excellent 50-watt tubes, I hasten to pass along the dope. I am living in Montreal at the present time. We can procure the 50-watt and other types of Western Electric tubes over here quite easily, because the Northern Electric Company are now manufacturing several types of these tubes in Canada. Their factory is here, so the gang are patting themselves on the back. The old VT-1 is coming to life again but is now being called R203B, and I find it rather better than the old ones were.

de A. Canadian.

Some Helpful Suggestions

New York City.

Dear Eddy:

Let me offer a suggestion for this matter of message delivery. Nearly every month in "QST" some one urges us see that msgs. are delivered, but no one has told us how to stimulate msg. delivery. Now, why not have a report of the number of msgs. actually delivered, either over the air or personally, just as we now have a report

of the msgs. handled. This report I think would be quite a surprise to many of us when it is set up beside the number of msgs. handled.

Next, why do stations send the same msg. twice? On several occasions I have delivered a msg. and find that it had already been delivered. How come? On one occasion I had a msg. gg north. I gave it to some one up north and next day heard some one further south than me sending the same msg. north. Maybe this was a case of crazy routing but I doubt it.

Another thing, why do fellows say "Best 73's when 73 alone means best regards. Surely they don't mean best best regards. Just some more useless QRM—what?"

And now about short wave tuners. Here is an easy one for those using Reinartz tuners. On a 1½ in. tube wind 18 turns for plate coil, then break and in same direction wind one turn for aerial and 31 for grid. This makes five taps coming from complete coil. Now bring out leads on your regular Reinartz tuner from the extra grid switch point, from aerial switch, from plate switch, from the ground and from the coil side of the plate condenser. Connect these to the new coil in proper manner and by moving the three switches to proper points you have a tuner that goes down to about 80 meters (3750 K.C.) The coil is so small that you can doubtlessly get it in cabinet with rest of set.

73 to gang,
H. A. Chinn, 2CEG.

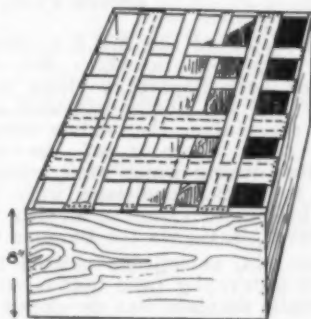
Muffling the "Synk"

Los Angeles, Calif.

Editor, QST:

A good many hams, no doubt have to put up with a fussy family. At least this is my misfortune. That the vibra-

SHOCK ABSORBER FOR SINK RECTIFIER



tion of my sink rectifier motor sounded like a rock crusher was the unanimous report given me by my family, so it was either a case of muffling the noise or going back to A.C. and I'd never do that.

Here is how I did it and I advise that hams who are in a similar fix try it out. A box frame of $\frac{3}{4}$ inch pine was made. By a box frame, I mean a box with the top and bottom knocked out. Eight inches is a very convenient height for this frame. Next take an old inner tube, but be sure the rubber isn't too old, and cut strips an inch wide and half the length of the frame long. These are stretched across the frame and secured as shown. Precaution should be taken in fastening these bands so that they will not tear. The best way, I found, was to use large headed tacks. In fastening the strips down, fold the ends of the bands over about $\frac{1}{2}$ inch—this acts as a washer and protects the underneath part of the band from tearing. These bands are spaced about two inches apart. After the bands in one direction are in place, those at right angles should be woven in and fastened down in the same manner. This forms a fairly good foundation.

Next two strips two inches wide are cut three quarters of their permanent length. These are placed about two inches apart at the place where the rectifier motor is to sit and two more strips the same width are run in the opposite direction. The rectifier is then placed on the shock absorber so that it rests on the bands only, and it is lashed to the two inch bands. This prevents excessive rocking when the motor starts. Do not fasten the wires to the wooden frame as the vibration will be carried on the wires.

This type of shock absorber takes up every bit of vibration and is most serviceable.

S. Thompson, 6BQY.

Static and Its Relation to the Mountains of Mexico

Roselle Park, N. J.

Editor, QST:

Having just read the A.R.R.L. news release of July 15th in which Mr. Kruse gives some very important views regarding static and its indefinite source as the Mexican mountains, the writer recalls a trip as radio operator of the tanker "Trontolite" during which some interesting data as to static conditions were noted. The trip took us to Tampico, Mexico, thence to Vancouver, B. C., via the Panama Canal.

On this trip, as will be noticed by the student of geography (and that is what the modern radio amateur has developed into), the cruise took the vessel completely around Mexico, giving me the privilege of listening to the wondrous noises they call Mexican static. In a certain part of the trip we were out of communication with shore for four days, on account of the static, although the apparatus aboard was capable,

under better conditions, of 2000 mile transmission at night.

Static, that is, honest-to-goodness tropical static, first becomes noticeable on a southern run when the vessel, bound for Mexico, nears Florida. There is also considerable static near Cuba, emanating possibly from the Cuban mountains. Turning west at Key West, ship operators are obliged to listen to the Mexican (?) static until they arrive at their western gulf terminus where they are given a short respite while the vessel loads and unloads. The conditions vary quite frequently in the Gulf; the writer has been forced to the deck at times by the static, and at other times the ether is comparatively free. I have never known the air to be entirely free from static in the Gulf, however, and the static increases in volume as the vessel approaches the Mexican Coast.

Leaving Mexican ports the vessel passes to the eastward of the Yucatan peninsula, then south through the Caribbean. The entire voyage is through tropical waters and the operators are given a *rare* treat of QRN. A very peculiar fact is noticed by all operators; that is the *entire absence of static from sunrise to noon*, the QRN increasing steadily from noon to midnight, making anything short of high-power short-range communication impossible. This fact does not apply so much to the Caribbean as to the Pacific. A great deal of static is experienced around Panama, and it increases as the vessel nears Nicaragua, maintaining its volume until about 1500 to 2000 miles south of San Diego. It is quite possible to work NPL, the San Diego Naval station, at this distance without interference by static.

Much greater distances are possible on the West Coast than on the Atlantic. For instance, the writer was in communication with Canadian VAE, Estevan Point, B. C., while off San Diego, using crystal only. And it took the vessel a week to reach the southern end of Vancouver Islands! If this were possible in the Atlantic, ships could talk with their old fashioned spark equipment to U.S. shore stations immediately after leaving European ports, instead of waiting until about two or three days from here.

In summing up the knowledge of static conditions gained on this trip, I cannot bear out what Mr. Kruse says about *all* the "long-distance" static that affects the U.S. originating in Mexico, but think that it is highly probable that a great deal does. In the opinion of the writer, the center of the disturbance appeared to be centered somewhat below Mexico in Nicaragua, and also in Cuba. We will agree on the statement that static in the U.S. is very slight, in fact unnoticeable.

Robert H. Horning, 2KK.

CALLS HEARD

(Concluded from page 62)

9A1Y, 9AJH, 9ALG, 9AMB, 9ANQ, (9APF), 9APW, 9APE, 9ASF, 9AUW, 9AVC, (9AVU), 9AVZ, 9AWM, (9AYU), 9AZG, 9BBF, 9BGI, 9BIK, 9BJC, (9BJI), (9BJK), 9BKJ, 9BLY, 9BOK, 9BSG, 9BUN, 9BTL, (9BXM), 9BXQ, 9BXT, 9BZI, (9CAA), 9CAC, 9CAO, 9CBA, 9CCV, 9CEA, 9CGA, 9CFY, 9CHE, 9CKJ, (9CJY), 9CMB, 9CMK, 9CNS, 9CPV, 9CRV, 9CUC, 9CVC, 9CVG, 9CWI, 9CWR, 9DAW, (9DFH), 9DGE, 9DGR, 9DGV, 9DGW, (9DHI), 9DJB, 9DKY, 9DLI, 9DOC, 9DOK, 9DTE, 9DTS, (9DUG), (9DVJ), 9DVK, 9DYG, 9EAE, (9EEA), (9EKH), 9XM, (9XAG), 9YB, 9YU, 9YW, 9ZN, 9ZT, 9ZY.

Canadian: 3BP, 3NI, 4CO, 4FN, 4HH, 5AK, (5CN), 5GO, 9BM, 9BX.

9ZT, Minneapolis, Minn.

C.W.: 1FD, 1KC, 1ANA, 1BBO, 1CPO, 2BN, 2FP, (2GK), 2QP, 2WR, (2AGB), (2CBW), (2CKL), 2CTO, 2CUI, (2CUR), (3AB), (3BG), 3JJ, 3SU, 3ARP, (3BBV), (3BFU), (3BGJ), 3BVA, (3CHG), (4FG), 4GL, 6KM, (6RM), 6AAK, (6ARB), (6AVN), 6BEO, (6BJQ), 6BNT, 6BVS, (6CBI), 6CGW, 7CF, 7FD, 7RY, (7ACF).

9AHC, Ellendale, N. Dak. (June and July)

C.W.: 3AJG, 3JJ, 4AI, 4FT, 6ALK, 6ANB, 6AO, 6BBC, 6BQC, 6CBU, 6CFI, 6RM, 7GO, 7IY, 7LR, (9AUU), (9AVZ), (9AYI), (9BKD), (9BMR), (9BZF), (9DDJ), (9DWN), (9EFN).

PHONE: 5ZAV, 9AUU, 9AVZ, (9AYI), 9CGA, 9CKD, 9CKQ, 9CLS, 9COJ, 9CTN, 9DDJ, 9DLF, (9DWN), 9CP, 9TL, (9YF).

No AERIAL or GROUND: 3AJG, 5FX, 5GA, 5GM, 5GN, 5KW, 5MM, 5NZ, 5AKY, 5ZAV, 5ZM, 6CBU, 7HM, 8APY, 8BCH, 8BFH, 8CVG, 8DGS, 8HV, 8JY, 8LS, 8VT, 8VY, 8WX, 8ZZ, 9AAL, 9AAP, 9AAU, 9AAW, 9AIC, 9AIM, 9AJH, 9AKE, 9AMB, 9AOU, 9APE, 9APW, 9AVZ, 9AXX, 9BAF, 9BGT, 9BHD, 9BHN, 9BIK, 9BKJ, 9BMR, 9BNO, 9BOL, 9BSG, 9BTT, 9BUN, 9BXQ, 9BZI, 9CAA, 9CAO, 9CDR, 9CGA, 9CIL, 9CIP, 9CTV, 9CVC, 9DCW, 9DDJ, 9DGE, 9DGV, 9DHP, 9DJB, 9DLT, 9DOC, 9DQA, 9DQE, 9DQM, 9DQU, 9DRO, 9DSW, 9DUG, 9DUQ, 9DVK, 9DXN, 9DYZ, 9DZY, 9EAK, 9EAF, 9EBI, 9EBT, 9EEA, 9EHJ, 9EHN, 9EFK, 9EY, 9GD, 9HG, 9IG, 9LZ, 9NU, 9QF, 9SS, 9YU, 9ZT.

E. A. Fensky, 7DG, Cordova, Alaska, Mile 14 Almost All Daylight Reception. (One Tube)

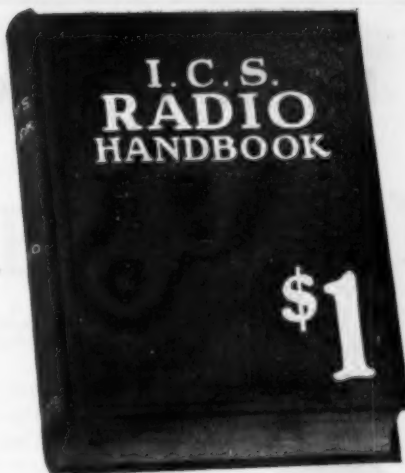
C.W.: 5BE, 5GE, 5MN, 5AEC, 6CC, 6EA, 6EB, 6CU, 6BU, 6HP, 6HV, 6IP, 6IV, 6GH, 6GX, 6MH, 6TL, 6TU, 6UM, 6ZH, 6ZQ, 6AAG, 6ABK, 6ABX, 6AGJ, 6ALV, 6APV, 6AOP, 6ARB, 6ARH, 6ASJ, 6ARV, 6AWT, 6BFY, 6BHK, 6BIC, 6BIK, 6BOD, 6BPL, 6BPZ, 6BQD, 6BQC, 6BRJ, 6BUY, 6BVG, 6BVS, 6BWD, 6CEI, 6CDM, 6CGW, 6CHL, 6COV, 6FA, 6FB, 6GP, 6JW, 6MC, 6MN, 6NK, 6OH, 6PF, 6TN, 6TF, 6TQ, 6TS, 6TG, 6TW, 6TX, 6YAC, 6BY, 6ADC, 6ADQ, 6AFE, 6AHL, 6AHQ, 6APY, 6EL, 9ZT, 9APF, 9BFG, 9BFM, 9DGV, 9DLI, 9DNB, 9EBT, 9EFK.

Spark: 6ACE, 6AOX, 6AUU.

Can. 5AC, 5AK, 5CN, 5CT, 5GO, 4PN.

Army: BT3.

The above were copied from March to June.



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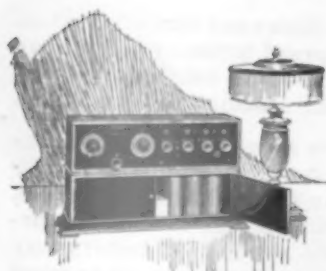
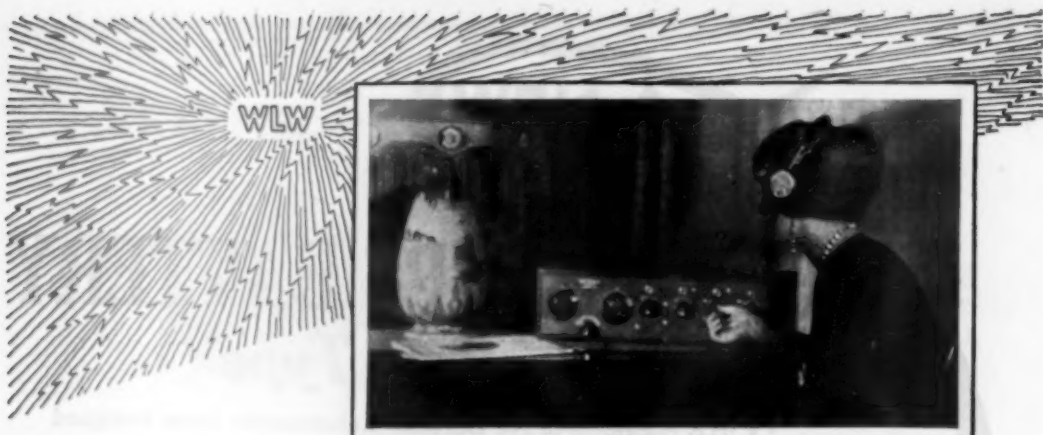
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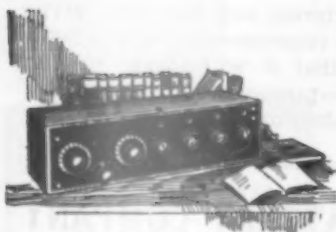
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"I have found the Crosley Model X to be the best radio receiving set I have used and permit me to say that I have been interested and using radio sets since spring of 1922 including all standard makes."

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4. Elimination of Binding Posts on Front Panel. By removing the binding posts to the rear the beauty of the set is greatly enhanced.
5. Sockets—Porcelain sockets are replaced with black compound sockets which are just as efficient and better looking.
6. Condenser—The New Molded Crosley Condenser made of specially prepared compound will out-perform any condenser on the market.
7. Multistat—Allows the use of all makes of tubes. (Now a feature of the standard Model X.)
8. RFTA Coil—New low resistance coil permits sharper tuning.

Write for descriptive pamphlet.

For Sale By Good Dealers Everywhere

Crosley Manufacturing Company

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CINCINNATI, O.

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Boston, B. H. Smith, 755
Boylston St., Room 316
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cate Trust Bldg.

CROSLY

Better - Cost Less

Radio Products

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

Pleasant Evenings in Camp With a Crosley Portable

No matter how far into the wilds you go on your vacation, you can keep in intimate touch with the outside world and enjoy its pleasures in the evening.

Crosley Portable Radio Outfits have made this possible. Absolutely complete in their compact cases, they may be easily carried and quickly set up.

After a hard day's motoring, fishing or canoeing what a pleasure to get out the old pipe, sit before the camp fire and listen to music, plays and innumerable other interesting things. Get a Crosley Portable and take it with you on your vacation. It will afford you the least expensive pleasure you have ever enjoyed.

CROSLEY
Better—Cost Less
RADIO

CROSLEY MANUFACTURING CO.

918 ALRFED ST.,

CINCINNATI, O.



Crosley Model VI Portable

Consists of detector and one stage of tuned radio frequency amplification. Compact compartments are built into this set for batteries, phones, etc. Thousands of users have testified as to its satisfactory performance.
Price without tubes, batteries or phones.....\$40.00



Crosley Model VIII Portable

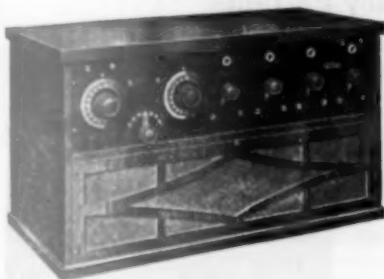
Consists of one stage of tuned radio frequency amplification, detector and one stage of audio frequency amplification. This set has the same general construction as Model VI Portable, but performs even more efficiently.

Price, without tubes, batteries or phones.....\$60.00

Free Catalog on Request

Three Beautiful Cabinet Models

The Last Word in Crosley Efficiency



CROSLEY MODEL XV
(Above)

The receiving apparatus in this model is the same as that in our cabinet Model XX. The cabinet contains no place for the batteries, however, placed on a mahogany table or stand, it forms an attractive piece of furniture. Price without tubes, batteries or phones.....\$70.00

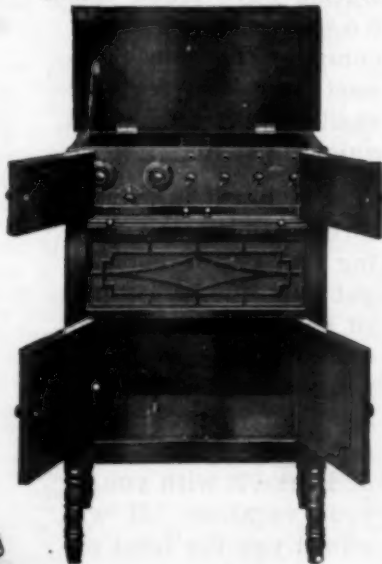
CROSLEY MODEL XXV
(Below)

We can conscientiously recommend this console model as the most beautiful and efficient model offered today. The receiving apparatus contains the same units as our model X though differently arranged. The cabinet, of mahogany, exceptionally well finished, is arranged to take the model R-3 Magnavox and also contains space for "A" battery, "B" battery and battery charger if desired. Guaranteed to bring in broadcasting stations 1000 miles or more distant so that they may be clearly heard all over the room. Price without tubes, batteries or phones.....\$150.00



CROSLEY MODEL XX
(Below)

This attractive model is our model X built into a highly polished mahogany cabinet. A hinged lid, when raised allows the operator access to every part of the receiving apparatus. A sliding board under the receiving apparatus forms a desk for the operator when desired. The lower compartment is made to take care of the batteries and the middle compartment contains a loud speaker which makes it possible for music, speeches, etc. to be heard clearly by everyone in the room. As a beautiful piece of furniture, this model is an addition to any room. Price without tubes, batteries or phones.....\$100.00



CROSLEY
Better—Cost Less
RADIO

CROSLEY MANUFACTURING CO.
918 ALRFED ST., CINCINNATI, O.

Crosley Radio Parts and Sets Popularity Proves Their Worth

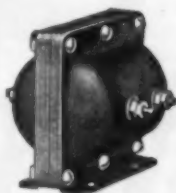
The fact that innumerable favorable comments are received daily from people everywhere who have used Crosley parts and sets with entire satisfaction leads us to believe that you too will find that they will fill your every requirement.



Model VI—Price \$28.

reception. Hundreds of testimonials have paid tribute to its efficiency.

This Model contains the stage of tuned radio frequency amplification brought to 100% perfection by the Crosley Company. For its price and size, it gives surprising results in long range

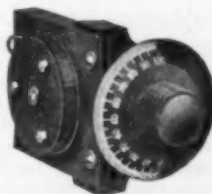


**CROSLEY
SHELTRAN
TRANSFORMER**

Price\$4.00

The Crosley Sheltran is a completely shielded transformer. Embodied in it are all the characteristics so essential to obtain maximum amplification from the modern vacuum tubes used in radio work. Tests have proven the design to be correct to insure maximum efficiency.

The Crosley Radio Frequency Amplifying Tuner consists of an inductance coil and a Crosley book type variable condenser. It can be tuned to any wave length between 200 and 600 meters. When used with non-regenerative sets it will increase the range many times.



**CROSLEY
AMPLIFYING TUNER**

Price\$4

CROSLEY
BETTER-COST LESS
RADIO

For Sale By Good Dealers Everywhere

CROSLEY MANUFACTURING COMPANY
918 ALRFED ST., CINCINNATI, O.

\$20

**Clear Reception
at Lowest cost**

*Armstrong
Regenerative
Receiver*

*Licensed under
Armstrong
U. S. Patent
No. 1,113,149*



**ACE
TYPE V**

FORMERLY
CALLED
CROSLEY
MODEL V

THE ACE Type V is a long range regenerative radio receiver. Signals received on it are clear and distinct. Stations from coast to coast are heard under ordinary conditions by owners of this set. Wonderful efficiency, simplicity of operation and low cost are the chief factors in the growing success of this receiver. They are the things that have made it the most popular on the market. Thousands of the Ace Type V have been sold, and hundreds of letters from the owners are proof of their success. Can be used with dry cell or storage battery tubes.

Those who desire to operate a loud speaker in connection with the Ace Type V later can add an Ace Type 2 B, a new two-stage audio frequency amplifier, to the set. Then music or voice being received from a far-away station will be heard throughout the room or house. The price of the Ace Type 2 B amplifier is \$20.00.

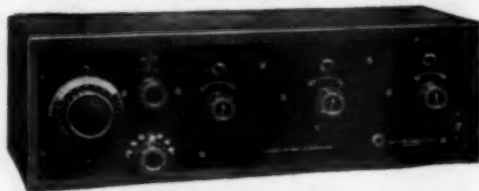
If your dealer cannot supply you, order direct, mentioning his name. Ask for "Simplicity of Radio." Your copy is FREE.

DEALERS—Write on your letterhead for attractive sales proposition.

THE PRECISION EQUIPMENT COMPANY

Douglas Crowley Jr. PRES.
918 Vandalia Ave. Cincinnati, Ohio

The New Ace Type 3 B

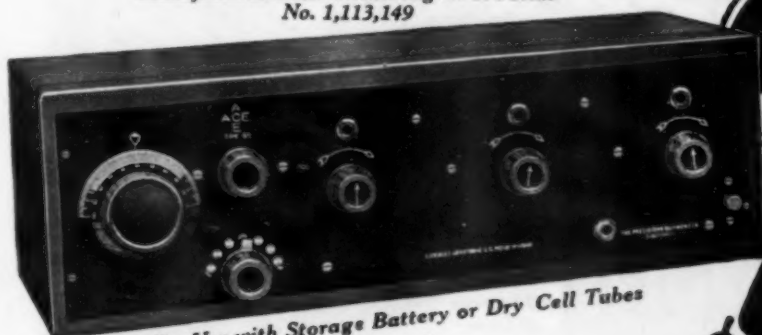


A new member of the Ace family selling for \$50, which is equal to a combination of the Ace Type V and the Ace two-stage amplifier. Like the Ace Type V it is manufactured under Armstrong U. S. Patent No. 1,113,149. This set is new, but months of research work have brought it to a high degree of perfection. Out-performs receiving sets costing great deal more. A filament switch eliminates necessity of turning out rheostats when set is not in use. A person hearing a broadcasting station may turn off the set by throwing switch and come back later without retuning. A telephone jack is between first and second stage of amplification. This is for use of persons who desire to use head phones instead of loud speaker. Crosley Multistats, universal filament control rheostats for all makes of tubes, also are used in the Type 3B. **Price, \$50**

THE NEW ACE

Three Tube Regenerative Receiver

Manufactured under Armstrong U. S. Patent
No. 1,113,149



For Use with Storage Battery or Dry Cell Tubes

If your dealer cannot supply you, order direct, mentioning his name. Ask for "Simplicity of Radio." Your copy is FREE.

DEALERS:

Write on your letterhead for attractive sales proposition.



The Ace Type V

Armstrong Regenerative Receiver

The low cost of this set together with its efficiency and simplicity makes the great demand for it increase daily.

A long range receiver. Stations from coast to coast can be heard distinctly. An Ace Two-step Amplifier in connection with this set at \$20 makes use of loud speaker practical. Has Crosley Multistat, which permits use of any make tube.

\$20

3B

ONLY

\$50⁰⁰

This New Ace Type 3B Armstrong Regenerative Radio Re-

ceiver combines detector and two stages of Audio frequency amplification. The lowest priced quality receiver ever offered.

When you tune in with this set distant stations come in as though they were only a few miles off. The two stages make the use of a loud speaker possible—this is a desirable feature. Its efficiency has passed every test.

One of the few sets that functions perfectly with all makes of tubes. Has filament switch which eliminates necessity of turning out the rheostats when set is not in use. With this switch you can turn off set and come back later to same concert without retuning. The telephone jack makes it possible to use head phones. When head phone plug is inserted it automatically eliminates loud speaker, but does not affect the filament current. Has genuine mahogany cabinet with beautifully engraved panel.

THE PRECISION EQUIPMENT COMPANY

918 Vandalia Ave.

PRES.
Cincinnati, Ohio

SHUTS OUT NOISE

Takes the place of other rheostat or filament control without re-drilling holes in panel.

The FIL-KO-STAT is the filament control of INFINITE adjustment, with a fine adjustment area 18 times greater than a wire rheostat, and several times greater than the next best filament control.

There are no screws to tamper with on the FIL-KO-STAT. No wires! No discs to chip or break! No adjustments to puzzle! Triple tested and adjusted at the factory to the ideal "off" for UV200, 201, 201A, WD11, WD12, UV199, DV6A, W. E. Peanut and *all* other tubes including 5 watt transmitting tubes. Hailed by amateur and professional radio men as the greatest step forward in the development of the tuning possibilities of the vacuum tube.

FIL-KO-STAT supremacy is proven by every test.

Price

\$2

In Canada 275

Recommended
and sold by dealers
in high quality
radio supplies.

MADE AND GUARANTEED BY **INSTRUMENT**

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SOLE INTERNATIONAL DISTRIBUTORS

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New York

You Will Want This Book

Send 10c for "Radio Pocket Reference" by W. G. Merritt Garvey (of New York World Radio Staff), tables, 17 booklets, diagrams, etc. Reading this interesting book, we discovered that Mr. Garvey recommended the FIL-KO-STAT for fine filament control. We bought an edition of these books, and will send a copy anywhere at handling cost of 10c.



The New

THORDARSON

Super Transformer

More than a quarter of a century has been devoted by Thordarson engineers to the design and development of power transformers ranging in size from the smallest bell ringer to the first 1,000,000 volt transformer the world ever saw.

That knowledge and practical experience has been intelligently devoted to devising an Audio Frequency Amplifying Transformer that would produce the greatest volume consistent with true tone quality.

Here it is—its specifications and efficiency under all atmospheric conditions and over all audible signals, ranging from 100 to 7,000 cycles have been tested and endorsed by the

foremost radio engineers in the United States. Thousands of these new amplifying transformers are daily furnishing the means to greater pleasure and entertainment to discriminating radio amateurs and experimentors.

Developed and manufactured entirely by Thordarson engineers in the Thordarson plant

It is not merely an assembly of bought coils, core iron, etc., as is the case of most audio frequency transformers in the market.

Core is made of .007 highest grade silicon steel, No. 36 gauge, the cross section of which measures $\frac{3}{4}$ inch—twice that of the usual type transformer. Coil is square layer wound of No. 40 wire to fit the square core. The winding process and machinery were designed and developed exclusively by Thordarson.

The basic principle and construction of this new Thordarson product are scientifically, electrically, and mechanically correct. Exhaustive tests and experiments have proved conclusively that:

1. Core losses are reduced to a minimum.
2. Over-saturation of the core is eliminated.

3. When in use the resistance of the plate circuit of one tube and the resistance of the grid circuit in the following tube are balanced to a degree heretofore unequaled.

4. The received energy is increased sufficiently to actuate loud speaking devices without distorting the incoming signal.

5. The volume produced is as great as pure tone quality reproduction will permit.

The new Thordarson amplifier is the choice not only of thousands of amateurs and experimentors, but an increasing number of leading receiving set manufacturers now specify Thordarson Transformers as standard equipment.

Make your own test

Words nor pictures nor specifications alone can do justice nor prove the superiority of Thordarson products. Let your own ears guide you in your comparison.

SOLD AT ALL GOOD DEALERS

PRICE, MOUNTED ONLY

6 to 1 ratio transformer . \$4.50
(with Red Label)

$3\frac{1}{2}$ to 1 ratio transformer 4.00
(with Blue Label)

THORDARSON

ELECTRIC MFG. CO.

Huron and Kingsbury Streets, Chicago

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS



THE NEW PLUG

A WESTON PRODUCT

Unique — exceptionally handy — especially constructed for speed and perfect contact.

Originally designed for our own use only—but the plug was so outstanding in its special features and merit it is now offered to the public.

So Convenient!

will be your first exclamation.—When you are in a hurry—just shove the terminals into a Weston plug—instant contact.

Or to disconnect with equal speed—press the triggers and pull out your terminals. No broken fingernails—no tools required. Requires but a fraction of a second to connect or disconnect it. Looks as good as it works—typical of Weston workmanship. Try one and see if this is not infinitely superior to any plug you have ever used.

At All Dealers—Price \$1.00

If your dealer can't supply you—sent postpaid on receipt of price and name of your dealer.



WESTON ELECTRICAL INSTRUMENT CO.

158 Weston Ave.,

Newark, N. J.

Makers of the world's Standard Electrical Instruments



WESTON

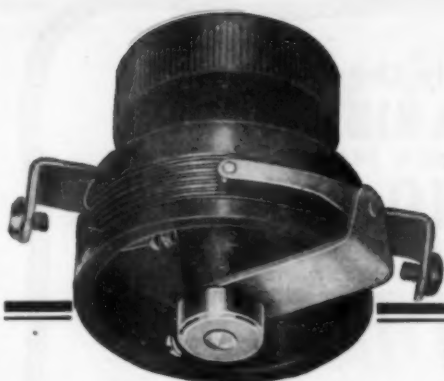
STANDARD - The World Over

WATCH for the

METALECTRIC SOLDERING IRON

"BUILT TO THE SPECIFICATIONS OF THE RADIO ASSEMBLER"

Post Electric Co., Mfrs., (Sec. Five) 30 E. 42nd St., N. Y. C.



Unity Vernier Rheostat
Successor to the Jenkins Rheostat
\$1.75 in U. S. A.

Announcing TWO NEW **UNITY PRODUCTS**

You will want one or both of them

The highest type Electrical Instrument for controlling resistance.

A single wire followed its entire length by a contact, permits the most infinitesimal variation in resistance.

A cut-out switch on the shaft operates with no change in the tuning adjustment. The contact on the resistance wire remains stationary.

An adjustment can be maintained and the tube turned on or off at will.

SPECIFICATIONS: Bakelite Base—Nichrome wire—Phosphorous bronze contacts, replaceable wire, permitting adoption to any tube. Made in any resistance. Stocked in 8 ohms, 20 ohms, and 40 ohms. All capacities \$1.75 list.

Interchangeable Resistance Cartridge



Unity Cartridge Rheostat
 Assembled \$.80
 Bracket - .45
 Cartridge - .35

The Unity Cartridge Rheostat

This wonderful new radio rheostat is the last word in convenience, and is a real time and money-saver. No need to buy an expensive new rheostat when you change tubes in your set. Simply buy the resistance cartridge which meets the requirements of your tube [cost is only 35c] and in a second's time you can substitute it for the old one by hand and *without taking the rheostat from the panel.*

Phosphorous bronze fork contact insures minute adjustment and absolute control of resistance changes. Nichrome Wire Cartridges are made in any resistance. Stocked now in 8 ohms, 20 ohms and 40 ohms. All cartridges 35 cents.

If your dealer cannot supply you send your money order to factory with your dealers name.

"Hear a set that uses one"

Unity Manufacturing Company
 228 North Halsted Street

*Automatic Screw Machine Products, Stampings,
 General Manufacturing on Contract or Royalty*



Only the Original
NATHANIEL BALDWIN
 MICA DIAPHRAGM
RADIO PHONES

—are sold under the absolute guarantee of satisfaction after a fair trial, or purchase price refunded, together with transportation charges.

These phones are manufactured under the personal supervision of the inventor. Their high efficiency in radio reception more than doubles your satisfaction and enjoyment from your receiving set.

Ask your dealer for the original BALDWIN. If he cannot supply you, write for circulars and price lists.

NATHANIEL BALDWIN, INC.
 3474 South 23rd East, Street
 SALT LAKE CITY, UTAH

Attractive proposition open to distributors and dealers.

A.R.R.L. Members -- What about your friends?

You must have a friend, or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

American Radio Relay League,
 Hartford, Conn.

1923

I wish to propose

Mr. _____ of _____

Mr. _____ of _____

Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story

Just Out!

The New RADIO BATTERY EVEREADY "THREE"

THREE CELLS ~ THREE TERMINALS ~ THREE PURPOSES

May be used—

As an "A" Battery for portable sets having UV-199 Tubes.

As a "B" Battery for obtaining additional "B" Battery voltage.

As a "C" Battery for furnishing negative potential to amplifying Tube Grids.



Eveready "Three" has three Fahnestock Spring Clip Connectors making it possible to secure 1½, 3 or 4½ volts from the battery.

Ask your dealer or write us for circular No. 1025 giving complete information on this NEW Three Purpose RADIO BATTERY. Order Eveready "Three" by catalog number 771.

Made by the largest dry battery manufacturers in the world—makers of the famous

Eveready Storage "A" Batteries for Storage Battery Tubes;

Eveready Dry Cell Radio "A" Batteries for Dry Cell Tubes;

Eveready "B" Batteries for all Vacuum Tubes.

NATIONAL CARBON COMPANY, Inc.
Long Island City, N. Y.

Atlanta

Chicago

Cleveland

Kansas City

San Francisco

See our exhibit at Radio Show, Grand Central Palace, New York City, October 6-13

RELIABLE

EVEREADY

Radio Batteries

—they last longer

NOISELESS

Extraordinary ?



Not with the W. C. 5

Does your receiver *respond* to all waves from 200 to 550 meters? The W. C. 5 picks up stations that are broadcasting with wave lengths anywhere between 150 and 750 meters. The calls come in clear and distinct. This set is so efficient that it has picked up many stations on their lower harmonics.

Price \$80.00

The W. C. 5 is a 4 tube set. One stage of tuned radio frequency amplification is employed ahead of the detector to make it supersensitive. Two powerful stages of audio frequency are used to bring up the volume of signal strength. Simplicity of construction and the elimination of unnecessary parts make this set easy to operate and effective for receiving from long distances.

TO THE A.R.R.L.

We appreciate your efforts in boosting W. C. sets and are always pleased to furnish full information about them to members who have not yet had an opportunity to operate a W. C. 5. We want every member to know the merits of this efficient outfit. If you are interested we will gladly send you a complete description of the W. C. 5 together with information as to where you can see one in operation.

Just drop us a line and we will see that your enquiry gets prompt attention

WESTERN COIL AND ELECTRICAL CO.
303-Fifth St., Racine, Wisconsin.

Ask Your
Dealer



The
Genuine
Duo-
Lateral

We call
them

Coil Supports
and Mountings
Licensed under
De Forest
Patents

BRANSTON Lateral Wound Honeycomb Ind. Coils

No other method of tuning has approached the wonderful flexibility of the Honeycomb Coil in changing to different wave lengths. If you are in doubt, ask your "Old Timer" radio friend why sets using Honeycomb Coils are better.

With Branston Honeycomb Coils you can get closer tuning, greater selectivity, greater range. Two outstanding features of the Branston Coils are—no dead end losses and ease of operation.

Send 2¢ in stamps for Series 1 "Hook-Up" Circular showing five good Honeycomb Coil hook-ups and Catalog of famous Branston Radio materials. Write today giving your dealer's name. If he can't supply you, let us know.

CHAS. A. BRANSTON, INC.
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Toronto, Ont.



BRANSTON



Na-ald Special
Socket No. 499



DeLuxe
Contact



Na-ald DeLuxe
No. 400

It's the contact that counts

A careful examination will show that each contact in Na-ald sockets and adapters is of a wiping nature on a broad surface, and of sufficient tension, and so designed that tension is permanent, no matter how often the bulbs may be removed and how much the connecting prongs in the tubes vary.

It is little realized that sockets are being sold which, owing to faulty choice or control of material, develop current leakages from plate to grid that rob many otherwise well-made sets of their efficiency. Na-ald sockets in their design avoid all these troubles.

NA-ALD SOCKETS

No. 499 Socket, 199 tubes..	\$0.50
No. 429 Adapter, 199 tubes	.75
No. 400 DeLuxe, 200 tubes	.75
No. 401 Small Space, 200 tubes35
No. 411 W.D.11 tubes.....	.75
No. 450 Two in one, W.D. 11 or 200 tubes.....	.50

Booklet with diagram of Hazeltine's Neutrodyne Circuit and other selected circuits packed with each Na-ald product.

Alden Manufacturing Co.

Manufacturers of Sockets for Every Tube and Requirement
Dept. M 52 Willow St.
Springfield, Mass.





Everybody loves a Trutone



TRUTONE
SENIOR

DEALERS:

Take care of the demand in your territory for TRUTONE HORNS and LOUD SPEAKERS. Ask your jobber about them or write us direct.

TRUTONE SENIOR is a beautiful radio loud-speaker. It stands 32 inches high and the bell of the horn is 14 inches in diameter. The horn is made of crystalline enamelled composition which is seamless and free from any metal.

This model is large enough for any home or hall. The base contains built-in reproducer with heavy mica diaphragm.

The Senior operates perfectly on two stages of amplification and is suitable for all long distance work. Complete with 6 feet of cord \$25.00.

AMPLIFYING HORNS

TRUTONE AMPLIFYING HORNS are designed for use with any type of phone receivers.

The horns are made of seamless composition beautifully finished in crystalline enamel.

Tone chambers of well seasoned wood make these amplifiers wonderfully resonant and both bases and horns are entirely free from any metal.

Type "A" is for use with any 2 phone receivers. It stands 24 inches high and the bell of the horn is 12 inches in diameter.

Type "B" is for use with any single phone receiver, stands 22 inches high and the bell of the horn is 12 inches in diameter.

Price of either model complete \$8.00

Horn only \$6.00

Base only \$2.00



TYPE "B"

TRUE
TO
THEIR
NAME



SADLER MANUFACTURING CO.

86 FOURTH STREET

San Francisco

California

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

LOOK

**A Long and Skinny Antenna Insulator 18 inches between wire holes
one inch in diameter**



MADE of the best highly vitrified high tension white glazed porcelain, especially prepared for making these insulators. Low capacity between terminals; a good dielectric with low electric absorption; will not absorb moisture.

Greater DX transmission with Sure Fire Antenna Insulators.

**In Lots of Six or More
One Dollar Each**

Express C.O.D.

**9DNH SURE FIRE RADIO LABORATORY
Macomb, Illinois**

(H&H) Radio Material

Nutmeg Brand

**Based on 30 Years' Manufacturing
and Electrical Development-Work**



NUTMEG Brand covers a complete line of Radio Material and Apparatus. We carefully handle orders direct where the goods are not sold locally. If your Dealer cannot supply you, send us his name and address and secure, in return, a photo of an excellent one-step dry cell hook-up—free.

Specials:

W 300 6 Ohm Rheostats	\$.85
W 299 30 Ohm Rheostats85
W 298 6 Ohm Rheostats	1.00
W 297 6 Ohm Rheostats, with Vernier Dial Control, at an introductory price	1.25

Write for valuable informative circular

THE HART & HEGEMAN MFG. CO.

HARTFORD, CONN.



POWERFUL MAGNETS

Compare—Then Buy

Test the magnets in each head set. See how far they will pick up their diaphragms. Then you will find that Stromberg-Carlson Head Sets have powerful magnets. Those powerful magnets with the equally powerful windings are two reasons why they are unexcelled for long distance reception.

Stromberg-Carlson

RADIO HEAD SETS

have other distinctive features:—

The receivers are layer wound and layer insulated. They are balanced as to volume. The adjustment rods telescope.



**Stromberg-Carlson
Telephone Mfg. Co.
Rochester,
N. Y.**



Are you the man

*who will win one of the fifty prizes
offered by Acme for the best results
obtained with radio frequency this summer?*

FOR the best article setting forth how radio frequency has helped conquer summer static and other forms of interference (such as radiating receiving sets and spark transmitting stations) the Acme Apparatus Company will pay \$250.00 in cash. To the second best, \$150.00 and to the third best \$100.00 in cash. To the next 47 best articles this company will give prizes of different Acme Apparatus ranging from \$80 for Acme phones to \$5 for radio and audio frequency transformers.

The article must narrate the personal experiments and experiences of the writer, in securing distant stations, in avoiding interference and distortion, and in securing volume and clearness of reception. Wiring diagrams showing the hook-ups used to secure the best results

will add greatly to the value of the article. The articles must not exceed 500 words in length. Radio frequency transformers of any make or brand will be eligible. The contest started June first and ends September thirtieth. All articles must be postmarked not later than October first.

In case of a tie, each tying contestant will receive the full amount of the prize. Everybody outside the Acme organization is eligible. Do not stay out of the contest for fear that you are not an "expert." A novice with natural mechanical or electrical ability may capture first prize. Send the coupon below or apply to any radio dealer to secure complete details, including list of judges and prizes.

ACME
for
amplification

ACME APPARATUS COMPANY,
Dept. 30, Cambridge, Mass.

Please send me detailed information on
Acme prize contest on radio frequency.

Name
Street
City
State



JEWELL LIGHTNING ARRESTER

APPROVED BY
UNDERWRITERS

The latest regulations of the National Board of Fire Underwriters call for a lightning arrester on every building having an outside aerial.

The Jewell Arrester has passed all the Underwriter's tests and carries their approval.

The case is made of porcelain with a brown finish that harmonizes with interior woodwork. The price is right.

PRICE \$1.10

ORDER FROM DEALER.

**JEWELL ELECTRICAL
INSTRUMENT CO.**
1650 Walnut St., Chicago



THE CENTICOUPLER

Approved by every Radio Fan from the Technical Wizard to the Woolworth Shopper
Approved because it is scientifically unique in construction, because it makes a 1000 meters with ease, because it has a genuine bakelite stator and a kiln dried rotor, because it is bank wound, because each tap eats up its 100 meters neatly, because—but why write history? See for yourself.

Get One for \$5

20 Diagrams with Each Instrument **FREE**

For sale at your dealer—otherwise send the \$5 directly to the manufacturer and you will be supplied at once postpaid

G. H. FISCHER & CO.

123 Liberty Street, New York City



BARGAINS

**In All Makes of Radio Material—
Send for Our Special Summer
Bulletin No. 30**

We carry Radio Corporation, Federal, Magnavox, Acme, Frost, Chelsea, Electrose, Atwater-Kent, Cutler-Hammer and many others.

We are distributors for practically all the leading makers.

**PROMPT AND EFFICIENT SERVICE
TRY US AND SEE**

Whitall Electric Company
Westerly, Rhode Island

Morrison



Loud Speaker

Deep Notes—Sweet Notes

both come equally true-toned and full-volumed over your Radio set when your phonograph or horn has a Morrison Loud Speaker

Perfect Reproduction

The real joy of radio is assured you. No rattle or vibration, no metallic harshness, even when the amplification is extreme.

Anyone can attach the Morrison Loud Speaker to the tone arm of a phonograph in a moment's time. A slight adjustment of the knob or dial on the rear ad-

justs the tone, soft or loud, just as you wish. There is nothing else to do—nothing to get out of order—you just begin to really enjoy radio when you use the Morrison Loud Speaker.

Adaptable for use on any tube set with one or more stages of amplification.

Sold on a money back guarantee. Price, complete with five foot cord, nickel finish

\$10.00

Order from your dealer or direct from us. Send today for beautifully illustrated catalogue—it is free.

Dealers

If you are interested in one of the fastest-selling Radio units on the market wire, or write at once for our proposition—it is interesting.

MORRISON LABORATORIES, INC.,

335 Jefferson Ave., East, Detroit, Mich.



When You Build Your Own Set, Put Good Stuff Into It

Costs less, in the long run, to build it the Signal way, rather than to experiment with unknown accessories and parts.

Signal Cabinets—Mahogany finish, shipped knock-down. Thirty-two different sizes and shapes, including exactly the dimensions to fit your particular set. Send for list and prices.

Signal Binding Posts. Turned on automatic lathes from special-analysis hard phosphor bronze rods. Correct in every detail; $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{2}$ in. dia., lacquered or nicked. List price \$2.75 to \$8.00 per 100.

Switch Contacts. Signal contact points cover the whole range of sizes— $\frac{1}{16}$, $\frac{1}{8}$ and $\frac{1}{4}$

inch diameters and corresponding heights and shanks—all made from special analysis phosphor bronze, heavily nicked. List prices range from \$1.20 to \$3.00 per 100.

Tell your Dealer to give you "Signal" accessories and supplies. If he does not carry them, write us, and give his name and address.

SIGNAL Electric Mfg. Co.

Factory and General Offices
1915 Broadway,
Menominee, Michigan.

Atlanta
Chicago

Boston
Cleveland

Pittsburgh
St. Louis

San Francisco
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You'll find our local address in your Telephone Directory.



"ILLINOIS" THE RELIABLE CONDENSER THAT IS MADE RIGHT AND STAYS RIGHT

Size	Panel	Cased
67 Plates...	\$7.00	\$8.50
43 Plates...	3.50	4.75
23 Plates...	2.75	4.00
13 Plates...	2.25	3.50

Vernier with single movable plate supplied to 13, 23 or 43 sizes, \$2.00 extra. Send for Bulletin.

This list is inclusive of Fine Black, Moulded Dial. We also furnish the Condenser with smooth $\frac{1}{16}$ -inch staff suitable for Dial at 15¢ off list.

Fully Assembled and Tested. IMMEDIATE SHIPMENT. Money back if not satisfied. Just return within 10 days by insured Parcel Post.

Sent prepaid on receipt of Price, Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10¢. Canada, add 25¢.

20% discount on orders of 6 or more: AMATEURS! Pool your orders and get benefit of discount.

G. F. JOHNSON, 625 Black Avenue, SPRINGFIELD, ILL.



Style W Radio Key

A speed key designed for radio transmission and with which cramp is unknown.

Other types carried in stock.

Sample by mail, \$4.00

Send Stamp for catalog
No. 45-Q

J. H. Bunnell & Co.
32 Park Pl., N. Y. C.

MARLE TRANSFORMERS

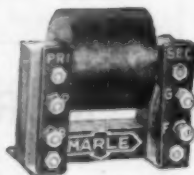
Audio Frequency
Radio Frequency

Superior Quality
Reasonably Priced

Ask Your Dealer
Manufactured by

Marle Engineering
Co.

Orange, N. J.



REMLER

APPARATUS
THAT RADIATES
QUALITY



Remler
Socket
Adaptor
Type 499

For using C-299 or UV-199 Tubes in sockets designed for C-11 and WD-11 Tubes.

Price \$1.00



Remler Dry Battery Tube Socket, Type 399
For Table or Panel Mounting, Price \$1.00



Remler
Socket
Adaptor
Type 599

For using C-299 or UV-199 Tubes in sockets designed for use with standard storage battery tubes.

Price \$1.00

Three New REMLER Items

of unquestionable merit, for use with C-299 Tubes

THESE three new appliances, a socket and two adaptors, for the C-299 and UV-199 dry battery tubes, are in every detail representative of *Remler Quality Apparatus*.

They are perfect not only from the standpoint of manufacturing quality and appearance, but from the standpoint of mechanical and electrical design.

Each of these items provides for the easy insertion of the tube in such a manner that it will not be jarred and become

damaged, and have that strong positive contact so essential in any tube socket or adaptor to insure quiet and efficient operation of the circuit in which it is used.

We are pleased to recommend these three items to the public as being representative of the quality of all Remler apparatus. We are confident that your use of any of these articles will make you permanent Remler customers. Ask your dealer to show them to you, or write direct for our complete descriptive bulletin.

REMLER RADIO MFG. COMPANY

Factory and Home Office
248 FIRST STREET, SAN FRANCISCO

Eastern Sales Office
154 W. LAKE STREET, CHICAGO, ILL.

FRESHMAN RESISTANCE LEAKS

The largest and most
Complete line in the World

Our new construction of all types Variable Resistance Leaks produces a product which we can now guarantee as being scientifically correct, mechanically perfect and built for unusual durability.



Every tube and every circuit requires a different leak resistance. You do not know what value is necessary until your circuit is tested. Freshman Variable Resistance Leaks give an unbroken range of 180 degrees from zero to five megohms.

Base Mounting Type with either .00025 or .0005 Freshman Condenser Without Condenser.....75c



PANEL MOUNTING

Freshman Variable Resistance Leaks will enable you to get stations you have never heard before. Can be mounted on any panel in a few seconds. The latest and

most essential part of an efficient tube set.

With either .00025 or .0005 Freshman Condenser Without Condenser.....75c



FRESHMAN

"FIX-O"

Fixed Resistance Leak Combination
—4 in one

Freshman Condenser .00025, Safe-T-Handle Leak Mounting, Freshman Resistance Leak Complete 65c



FRESHMAN

FIXED

Resistance Leak with Safe-T-Handle

The only Resistance Leak using no carbon, graphite or lamp black. Guaranteed to remain always constant. Furnished in any value of Resistance from 1/2 Megohm up 30c



FRESHMAN NOISELESS

Tested Mica Condenser and Leak Mounting

The Freshman Condenser is so designed that constant equal pressure is exerted over the entire area of the condenser plates and the mounting is part of the condenser itself, which makes this new product the only True and Perfect Leak Mounting on the market.

Combination Condenser .00025 and Leak Mounting 40c

All Freshman Products at your dealers—otherwise send purchase price and you will be supplied postpaid. Also ask your dealer for our free diagrams of the Neutrodyne, Flewelling and Kaufman Circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products

106 SEVENTH AVE.,

NEW YORK

static?

John A. Burrichter, 207 E. Ohio St., Indianapolis, Ind. writes:

"My set is about ten blocks from one of the local stations and when they started broadcasting, it meant that ended everything for the evening. After your Wave Trap was installed, they were tuned out completely.

Had expected with approach of warm weather to take down my set until next fall, but while other local 'Listeners In' are almost entirely cut off by STATIC, I am enjoying the programs just as much as in the cold months. Have covered distances that heretofore have been impossible and really consider the Wave Trap the greatest invention since radio."

THE ORIGINAL WAVE FILTER \$8.50
PREPAID

use
FERBEND
Wave Trap
TRADE MARK
PATENT APPLIED FOR

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RUSONITE
CRYSTAL RECTIFIER

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THE PERFECT SYNTHETIC
CRYSTAL DETECTOR

SENSITIVE OVER ENTIRE SURFACE

No Hunting for "Spots." Loud and Clear.
Endorsed by Thousands of Satisfied Users.
Sensitivity Price
Guaranteed Mounted 50c

14K. Gold Supersensitive
RUSONITE CATWHISKER, Price 25c
Permanent. Will not Oxidize.

RUSONITE REFLEX CRYSTAL
Manufactured Expressly for Reflex Circuits.
Will Stand Up Under Heavy Plate Voltage.
Price
Guaranteed Mounted \$1.00

Order from your dealer or direct from

RUSONITE PRODUCTS CORP.

15 Park Row,

New York, N. Y.

Forget your battery troubles

*The complete line of Exide
Radio Batteries meets every
requirement in radio receiving*

YOUR success in radio receiving depends largely on the quality of your batteries. And you are sure of satisfactory battery performance when you use Exides. A specially designed Exide Battery is now available for every type of vacuum-tube.

Whether you want a long-life storage battery for six-volt tubes, an A battery for low-voltage tubes, or a B battery, you can take your choice of Exide Radio Batteries and be sure of getting the *right* batteries for your set.

For low-voltage tubes

Two newcomers in the Exide radio family are two- and four-volt A batteries for tubes consuming .25 amps. at 1.1 to 1.5 volts, and those using .06 amps. at 3.0 to 3.5 volts. These sturdy little batteries were specially designed to meet the requirements of WD-11 and UV-199 vacuum tubes. Weighing less than six pounds each, they are midgets in size, but giants in power.

Exide Radio Batteries give steady, dependable current with only occasional recharging. They make it possible for you to reproduce broadcast selections in clear, bell-like tones.

In service over a generation

For more than a generation the Exide Storage Battery has helped to turn the wheels of industry. Long before radio broadcasting achieved its present popularity, the Exide proved its worth in commercial and marine wireless. It is used today in a majority of all government and commercial wireless stations. When the American public found in radio a new form of entertainment, the Exide became by reason of superiority the leading radio battery.

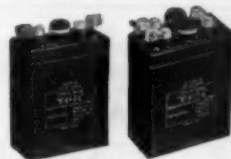
You can get Exide Batteries from a nearby radio dealer or Exide Service Station.

Ask the dealer for booklets describing in detail the complete line of Exide Radio Batteries, or write direct to us.



For six-volt tubes

Like all Exide Storage Batteries, the Exide A Battery for six-volt tubes is dependable and long-lasting. It is made in four sizes, of 25, 50, 100, and 150 ampere hour capacities.



Two- and four-volt A Batteries

The new Exide A Batteries consist of one and two cells, respectively, with rated capacities of 12 and 24 ampere hours. The two-volt A Battery will heat the filament for 96 hours; the four-volt A Battery for 200 hours.



Exide B Batteries

give noiseless, full-powered service over a long period of discharge. Designed throughout to prevent electrical leakage. Capacity, 3 ampere hours.

Exide

RADIO BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

Service Stations Everywhere

Branches in Seventeen Cities

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

Use accurate instruments at a saving

After all, fellows, it boils down to doing things *right*—the first time. And this is where little Omega Durham and his friend Dubilier help immensely. For both of these instruments are *made right*—by honest-to-goodness radio men. Values marked on them are dependable and stay so. Buying them together, you save trouble of assembly, much "cussing" at results, and 10% in first cost.

Get thru the traffic jam

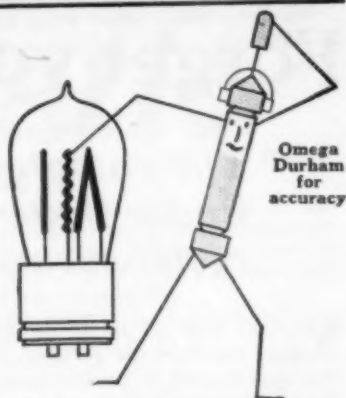
Fellows after traffic handling records can boost ratings with the accurate DURHAM one-finger grid resistance control.



Your choice
of values

\$1.10

Complete



Omega
Durham
for
accuracy

DURHAM + **DUBILIER**
Variables + **Micadons**

No. 101 —to 5 megs.
No. 201A—to 10 megs.

.00025 mfd.
.00050 mfd.

Your dealer has them now

DURHAM & Co.

Radio Engineers

1936 Market St., Philadelphia

Dealers and Jobbers:—Here's a number known to over 40,000 readers of "QST" alone. Will your present supply meet the fall set-building boom?

ATWATER KENT

RECEIVING SETS AND PARTS



If you are now working with a one-tube set, the 2-stage amplifier shown here will give you the necessary volume of sound to make a

loud speaker possible.

It is a compact unit—transformers are sealed in the base so that no dampness can affect the working quality of the instrument. To demonstrate the damp-proof qualities, one of these instruments was soaked in a tub of water for several hours, then put into a circuit and tested for reception with perfect results.

Send for an illustrated folder showing all parts and complete sets.

ATWATER KENT MFG. COMPANY
4945 Stenton Ave., Philadelphia



**RIGGS
RECTIFIER R**

\$12.50

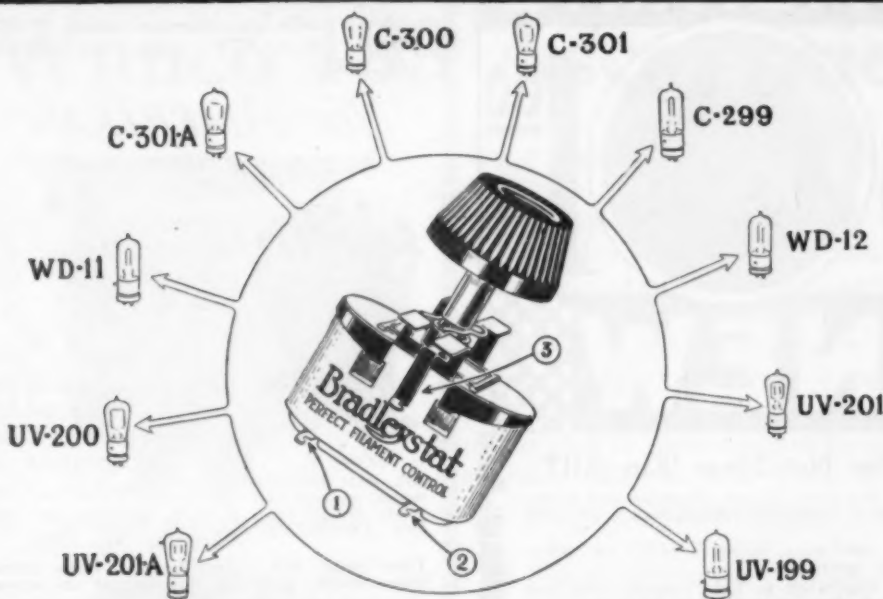
Prepaid
Anywhere
in the
U. S.

MONEY BACK GUARANTEE

We guarantee the Type B-3 to please you. If it does not, return it and we will return your money.

THE RIGGS MFG. CO.

Factories—Urbana, Ohio.
Everett, Wash.



One Rheostat for ALL Tubes -the Universal Bradleystat

The most perplexing problem in radio has been solved! It now is possible to use one rheostat for all tubes. This means that you can take advantage of all recent developments in receiving and amplifying tubes without rebuilding your set to make room for a new rheostat or an extra resistance unit to give the necessary control. The Universal Bradleystat with three terminals handles the entire range of radio tubes. A simple change of connections provides stepless, noiseless, perfect filament control for every tube.

Radio Dealers

The Universal Bradleystat is one of the greatest merchandising successes in the radio field. Dealers everywhere are capitalizing on Bradleystat superiority.

"Our electrician has requisitioned six Bradleystats for use on our meters in connection with their radio equipment."

Department of Marines and Fisheries
Halifax, N. S., Canada

"I find the Bradleystat very successful. It is compact, indestructible and all that one could wish for in radio work."

G. A. Her, Atlanta Journal

"The improvement rendered by the Bradleystat was remarkable and beyond all my expectations."

Chas. H. M. White
Massachusetts Institute of Technology

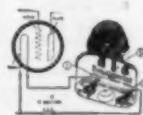
The Universal Bradleystat is a graphite compression rheostat. This means that the marvelously smooth control and long range, for which the Bradleystat is famous, are obtained by compressing two columns of graphite discs with a single control knob. In this way, you get vernier control without vernier complications.

There is no carbon dust in the Universal Bradleystat, because carbon dust can trickle out of the rheostat or become packed into a solid mass. It was abandoned many years ago by the Allen-Bradley Co. as unsatisfactory and unreliable. For your protection, the name Bradleystat is embossed on the porcelain container. Be sure to ask for the Universal Bradleystat. Try one, tonight!

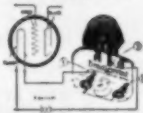
Allen-Bradley Co.
Electric Controlling Apparatus

277 Greenfield Avenue, Milwaukee, Wis.

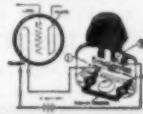
Manufacturers of Graphite Compression Rheostats for Twenty Years



For .06 amp. tubes



For 1/4 amp. tubes



For 1/2 and 1 amp. tubes

SOMETHING



NEW

Why Not Hear 'Em All?

Do you have trouble obtaining and maintaining a FINE adjustment with your radio set?

Do you want to make your set 100% MORE selective?

Do you want to hear stations that you believed your set would not bring in?

Do you want to eliminate some of the body capacity with which you have been troubled?

Do you want to improve the appearance of your set?

The answer to the above is the **UNIVERNIER**.

The **UNIVERNIER** provides ultra fine adjustment for ordinary variable condensers, variometers, vario-couplers, potentiometers and rheostats. It is SUBSTITUTED on the shafts of these instruments for the usual knob or dial and may be applied in a few minutes without altering your set.

The **UNIVERNIER**, as the name implies, is an instrument of precision and has that appearance. It is a tapered knob, well designed and made of moulded composition of high dielectric strength. Inside the knob is a simple mechanism so arranged that rotation of the knob is 12 times that of the instrument shaft. Light pressure on the knob permits coarse adjustment and causes the **UNIVERNIER** to function as an ordinary knob.

The **UNIVERNIER** not only makes every rotating instrument "vernier" in action, but it eliminates the necessity of procuring balanced instruments because its action is always positive and keeps all adjustments constant.

The **UNIVERNIER**.....\$1.00
360 degree finely graduated silver
plated dial for use with **VER-**
NIER 25¢ extra

Complete, \$1.25

Made in two sizes No. 251 for 1/4" shafts
No. 186 for 3/8" shafts

Size of knob 2 1/4" in diameter
Size of scale 3 1/4" in diameter

At your dealers or postpaid upon receipt of the above amount.

WALBERT MFG. COMPANY

929 Wrightwood Ave, Chicago, Ill.

Dealers and Jobbers Write For Discounts

UNIVERNIER

Amplification Perfection

with an audio transformer means PURE
TONE QUALITY with MAXIMUM
VOLUME

The AMERTRAN

AUDIO TRANSFORMER



Price \$7

Ask your electrical
dealer, or sent car-
riage charges col-
lect. (Wt. 1 lb.)

is acknowledged by professional radio engineers to be the STANDARD OF EXCELLENCE for audio amplification. The reason for the popularity of the **AMERTRAN** among professional radio men is apparent in the Amplification Chart shown in our Circular No. 1005.

Turn ratio, 5:1. Amplification ratio, 30-40 times audibility in the flat part of the curve.

American Transformer Company

Designers and builders of radio
transformers for over 22 years.

176 Emmet St., Newark, N. J.

Kellogg Radio Equipment For Better Results



The Kellogg Variometer

The stator and rotor are of Kellogg Bakelite, with properly proportioned windings of well insulated copper wire.

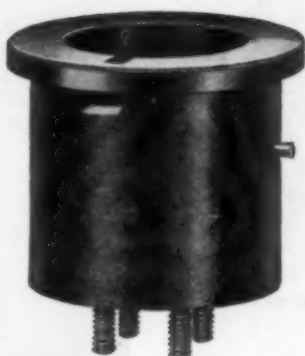
Two terminals are provided for the rotor and three for the stator, permitting the variometer to be used in all known variometer circuits.

Kellogg variometers have no sliding contacts; nothing to wear or "short." A spring takes up all play and allows the rotor to turn with a smooth even motion.

No. 501..... Each \$8.00

**KELLOGG SWITCHBOARD
& SUPPLY COMPANY
CHICAGO**

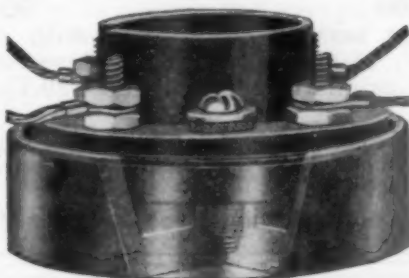
Wimco 199 Accessories



WIMCO 199 ADAPTER



WIMCO 199 SOCKET



WIMCO 199C SOCKET

WIMCO 199 ADAPTER makes it possible to use the UV199 or C299 tubes in any receiving set equipped with standard base sockets. It is moulded of Black Bakelite, is substantially made and well finished. Contact springs are of hard phosphor bronze, perfectly shaped, assuring excellent contact, and of low inherent capacity, thus making it ideal for use in radio-frequency circuits. **List price \$1.00.**

WIMCO 199 SOCKET is intended for use in new construction using the UV-199 or C-299 tubes. Moulded of Black Bakelite, is of pleasing appearance, occupies but little space, and is substantially made. Hard phosphor bronze springs, set on quarters, are used, assuring perfect contacts and low inherent capacities. Metal parts are nickel plated. **List price 75 cents.**

WIMCO 199C SOCKET employs the 199 socket, but equipped with a sub-base which conceals the simple and effective cushioning arrangement. For best operation a cushioned socket is recommended. This, together with the flexible pig-tail connections provided with WIMCO 199C Sockets, make it ideal for use in any receiving circuit. Metal parts are nickel plated. **List price \$1.00.**

We Invite Inquiries from Manufacturers, Jobbers and Dealers

THE WIRELESS MANUFACTURING CO.

CANTON, OHIO

Manufacturers—Distributors

The Standard Transformers

Audio and Radio Frequency

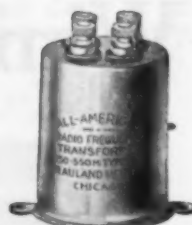
now being used in radio sets manufactured by leaders in the industry.

These manufacturers have expended a great deal of time and money in the testing of transformers to give best results. They can not afford to take chances. Their preference of "All-American" Transformers is your guide to real satisfaction.

Ask your dealer to show you "All-American" Transformers. Handsome in appearance, accurate in design, splendid results always; you will want them for your set.

Free Offer Book of Hook-ups containing twenty-five successful circuits. Send 2c stamp to cover postage.

RAULAND MFG. CO.
200 No. Jefferson St., Chicago, Ill.



Radio Frequency Transformer



Audio Frequency Transformer

General Electric Dynamotors for C.W. Transmission

Driving Voltage

12
8

Plate Voltage

550
400

Mills

130
90

Made for the United States Army Air Service. Equipped with a Dubilier Filter System. Using 2 1/4 MF. 1800 volts Mica Condensers. Ball Bearings Equipped. All new, in original cases. Price \$29.75. Half cash with order—balance collect.

We also have: CW-936 Sub Chaser Telephone Transmitting and Receiving Sets including:—Remote Control System, Power Amplifier, Loud Speakers, Tubes, Spare Microphone, etc. Can be tuned down to 150 meters.

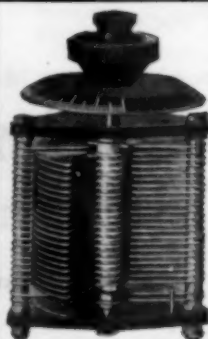
EKSAF TRADING CO., 1515 Eastern Parkway, Brooklyn, N. Y.



"Read'em" Binding Posts

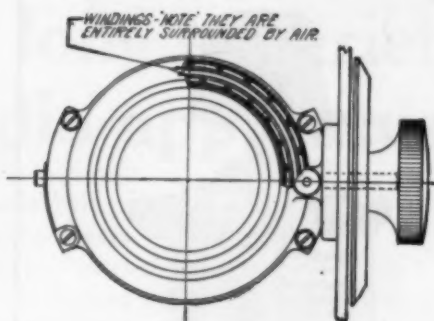
With knobs that won't come off Anyone can "read 'em." All popular styles—Antenna, Ground, Fones, A and B Battery plus and minus—abbreviations of different names engraved on knobs. Ask your dealer for "Read 'em"—the kind for real Radio fans. If your dealer does not have them—write direct.

The Marshall-Gerken Co.
Manufacturers
Dept. F. Toledo, Ohio



NOTICE SPECIAL FOR THIS MONTH VERNIER CONDENSERS

11 PLATE... \$2.25
23 PLATE... 3.00
43 PLATE... 3.50
PRICE INCLUDES
KNOB & DIAL
ALUMINUM PLATES
FORMICA END PLATES
GUARANTEED
M. C. E. Co., (Mfrs.)
441 Dorman St.
Indianapolis, Ind.



New Paragon \$5.00 Variometer

**Assures Maximum Efficiency on
New High-frequency Wavelengths**

The new band of wavelengths, recently enforced, involve radio currents of extremely high frequency.

This calls for an inductance unit of exceptional electrical and mechanical excellence.

Any amateur will quickly see why the ribbed design of our new No. 60 Paragon Variometer assures greatest efficiency at these high frequencies.

Material reduction of solid dielectric in the support forms permits us to offer this essential radio adjunct at an extremely reasonable price.

While comparatively lighter in

weight and considerably smaller than most variometers, our new Paragon No. 60 loses nothing in durability and gains much in overall (minimum to maximum) wavelength range.

In rebuilding his receiving equipment to conform with new standards, the radio-wise amateur will take these merits into account and will find it far easier to secure expected results on wavelengths of 150 to 200 meters with an inductance unit of this excellent design, than with any other.

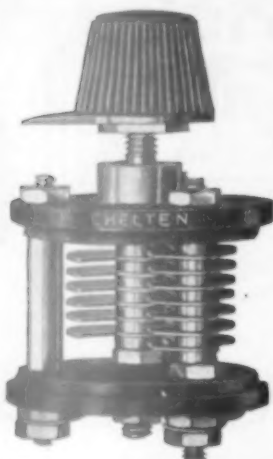
Write for complete catalog of Paragon Radio Products.

ADAMS-MORGAN CO., 4 Alvin Avenue, Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS



Sells for **\$1.50**
Actual Size

The Chelton Midget (VARIABLE CONDENSER)

Is one of the newest things in Radio. It adds a Vernier feature to your ordinary condenser. But one hole to drill in your panel. Fits in a space 1 1/2".

A precision instrument made to micrometer measurements. The seven stationary and six rotor plates permit of close graduation of capacity and when connected with any condenser the Chelton Midget makes possible sharper tuning and clearer signals.

Capacity .000045 Mfd. or about the same as a 3 plate condenser. The price puts it within reach of everyone.

We also manufacture a full line of High Grade Variable Condensers—Tube Sockets—Switches—Jacks—Plugs—Rheostats—Dials—Knobs—Crystal Detectors, etc.

*Your Dealer Should Have
These in Stock, If Not
Please Write Us Direct.*

*Since 1910 Manufacturers of
High Grade Electrical Specialties.*

Chelton Electric Company

4861 Stenton Ave.,
Philadelphia



A Tiny Instrument for compact sets—



UV199
or
UV 201A

PRICE
1\$

An Armorclad 30 OHM RHEOSTAT

Nichrome Steel Resistance Unit
Invisible Panel Mounting

MARTIN-COPELAND CO.
Providence, R. I.



*Natural
Re-PRODUCTION*

**Atlas
AMPLITONE**
LOUD SPEAKER

Blast and distortion conquered!!!
Double-diaphragm Re-PRODUCES
the full range of musical sounds.
Adjustable to varying receiving
conditions.

Hear the difference when your
dealer demonstrates the Atlas **\$25**
Amplitone

WRITE FOR BOOKLET "D"

Letters from Users Requested.

What have you accomplished with
your Atlas Amplitone? Tell us about it.

Multiple Electric Products Co. Inc.

RADIO DIVISION
ORANGE ST., NEWARK, N.J.

Twelve years is long experience in building radio apparatus!

THAT is the experience C. D. Tuska brings to the building of Tuska sets. A dozen years of heart and soul radio enthusiasm! C. D. Tuska was one of the founders of the A. R. R. L. and its first secretary. He was the founder and first editor of Q. S. T. As a war-time officer in the U. S. Air Service, he had abundant opportunity to improve his broad knowledge of wireless. As a member of the Radio Club of America and an associate member of the Institute of Radio Engineers, he has followed closely every step in radio progress.

For twelve years Mr. Tuska has been a manufacturer of radio instruments. There is a complete line of Tuska sets, ranging from sets suitable for modest purses and inexpert fingers, to the expert tuner sets that have trans-Atlantic range—also parts for experimental work. All of these are shown in our catalog, sent on request.

THE C. D. TUSKA CO., Hartford, Conn.



The New Tuska
Popular No. 225
Regenerative Receiving
Set, \$75 without tubes
or batteries. Licensed
under Armstrong Patent
No. 1,113,149. Special
circular 18-E sent on re-
quest.



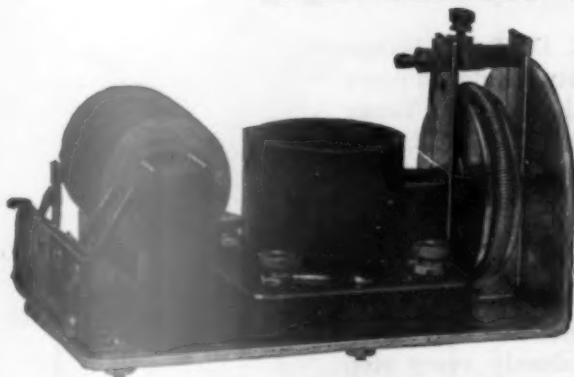
TUSKA RADIO

RADIO



PRODUCTS

USED IN COCKDAY FOUR CIRCUIT TUNER



DETECTOR UNITS

Cat. No. 139 Vernier \$3.00
Cat. No. 206 30 Ohm 3.00
Cat. No. 211 4 Ohm 2.40

AMPLIFIER UNITS

Cat. No. 198.....\$7.50
(Acme Transformer)

MOUNTING BRACKETS

Cat. No. 217.....\$0.30
Cat. No. 218..... 0.35

R. MITCHELL CO.

255 ATLANTIC AVENUE,

BOSTON, MASS.

Unusually Selective—Wonderful Tone—Long Distance Reception

MELCO-SUPREME

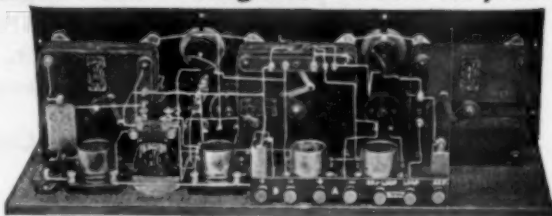
the Tuned Radio-Frequency Amplifying Receiver acclaimed by thousands as offering REAL RADIO PERFORMANCE—merely a 10 ft. wire being necessary for successful operation.

PRICE ONLY \$125

Knockdown parts including drilled engraved Bakelite Panel and solid mahogany Cabinet.....\$60

AMSCO PRODUCTS, Inc.

Fairbanks Bldg.
Broome & Lafayette Sts. New York



Mr. Lawrence Cockaday in his article on Tuned Radio-Frequency Amplification in August "Popular Radio" recommends the Acmedyne Circuit as employed in the Melco-Supreme.

Write for complete literature on both sets and parts.

HYGRADE SPECIALS

Skinderviken Transmitter Buttons..... .95
No. 763 Eveready 22½ V. Variable B. Bat. 1.25
No. 766 Eveready 22½ V. Variable B. Bat. 1.98
No. 767 Eveready 45 V. Variable B. Bat. 3.98
2000 Ohm Murdock No. 56 Head Sets... 3.75
3000 Ohm Murdock No. 56 Head Sets... 4.25
Federal or Brandes Head Sets Complete... 5.95
Dictograph 3000 Ohm Head Sets..... 5.98
Acme Amplifying Transformers (new type) 3.75
Acme R. F. Transformers. Types R2-R3-R4 3.98
6 Volt Marko Storage Batteries..... 8.95
Firco (Bull Dog Grip) Phone Plugs..... .75
Federal Amplifying Transformers..... 4.75
23 Plate Var. Cond. Bakelite Ends..... 1.49
43 Plate Var. Cond. Bakelite Ends..... 1.95
No. 184A Fada Neutrodon Condenser.... .98
No. 183A Fada Neutroformer..... 6.49
No. 185A Fada Hazeltine Parts..... 21.50

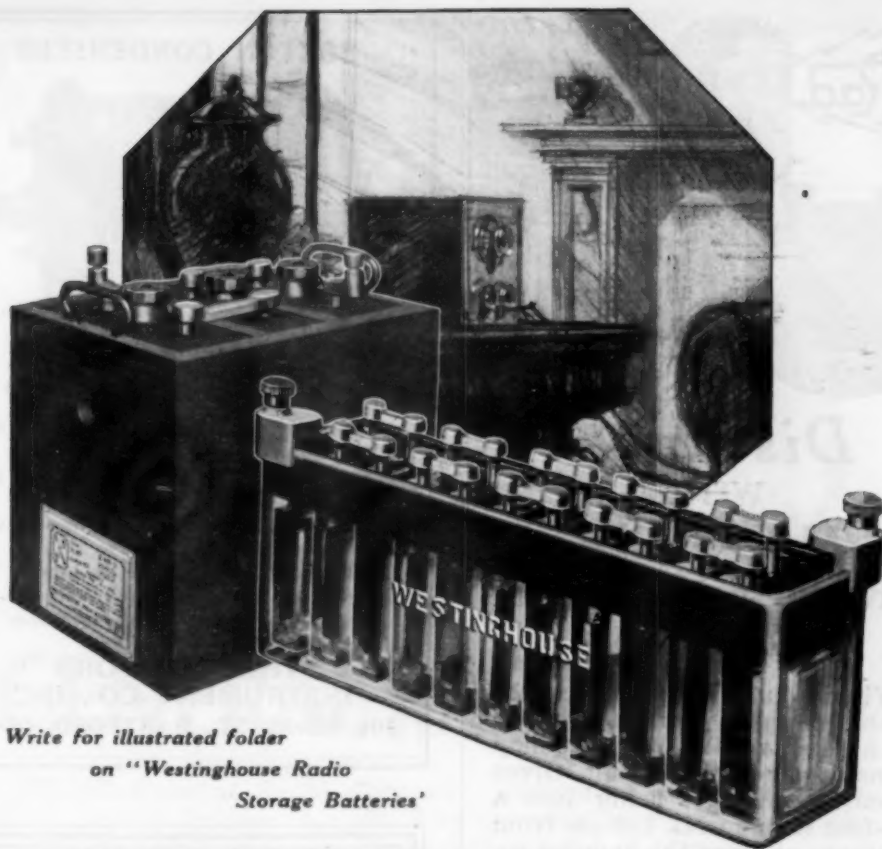
All orders must include Parcel Post charges.

HYGRADE ELECTRICAL NOVELTY CO.
41 West 125th Street New York, N. Y.



SOUTHERN RADIO CORPORATION

Radio Engineers and Jobbers
905 Realty Building, Charlotte, N. C.



Write for illustrated folder
on "Westinghouse Radio
Storage Batteries"

Complete radio satisfaction is a matter of strict attention to every detail of your set. To many radio folk a battery may be "just a battery," but the fan who gets the utmost in results knows that *right* batteries are very, very important—just as important as right tubes, transformers, coils, aerials, etc. Westinghouse Batteries are the product of both battery and radio engineering. They are *even-powered* as well as full-powered. (You know how essential that is to fine tuning.)

You'll be well repaid for determining to have only Westinghouse Batteries. There should be a dealer near you who handles them. If not, get them at any Westinghouse Battery Service Station.

WESTINGHOUSE UNION BATTERY CO.
Swissvale, Pa.

Westinghouse "B" Batteries

The 22-MG-2 (22 volts) is a marvel for long steady, noiseless service. Glass case; visible interior; sealed-in tops. Larger types, too; also 2-volt single "C" cells.

Westinghouse "A" Batteries

are full-capacity, slow-discharge, long-life batteries. Made in 4, 6 and 8 volt sizes, with 5, 9 and 13 plates per cell, to meet various filament requirements.



WESTINGHOUSE

Radio "A," "B" and "C"

BATTERIES

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS



**200-600
Meters
Air Core**

Distance WITH MU-RAD Radio Frequency Transformers

When you build your next set or change your present set, just try a Mu-Rad Radio Frequency Transformer in the circuit. Gives astonishing range, using just a two-foot loop aerial. Letters from amateurs all over the country report distance records as great as 4300 miles. Developed for the famous Mu-Rad Receivers.

No eddy current loss, iron losses or capacity effects.

No room for price comparison: Mu-Rad Transformers do so much more.

DEALERS:

Universal popularity is a safe buying guide.

Mu-Rad Products are standard.

For UV-199 Tubes
Use Type T-11 for the First Stage.
Type T-11A for the Second Stage.
Type T-11B for the Third Stage.

For UV-201A or WD-11 Tubes
Use Type T-11C in all stages with damping coil.

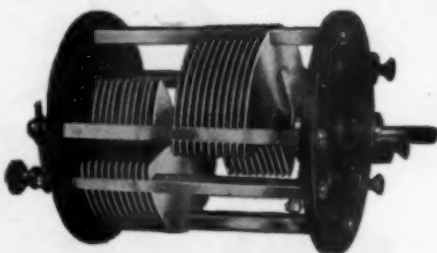
Get Our Interesting Proposition

Send 10¢ for R.F. circuit diagrams and treatise on Mu-Rad R. F. Amplification.

MU-RAD LABORATORIES, INC.

204 FIFTH AVE. ASBURY PARK, NEW JERSEY

SEXTON CONDENSERS



Vernier and Rotor Plates Controlled by Single Knob

"Pigtail" connections replace all sliding contacts.

Templates of gummed paper are provided for drilling.

Balanced models are equipped with "half capacity" switch.

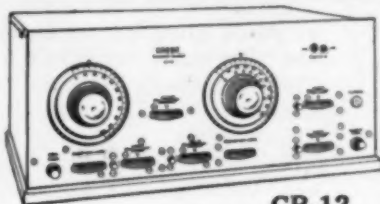
All Sexton condenser endplates are of mottled red and black bakelite.

Send for circular showing Prices

Manufactured by

**THE HARTFORD
INSTRUMENT CO., INC.**

308 PEARL ST., HARTFORD, CONN.



CR-12

The New Grebe Broadcast Receiver

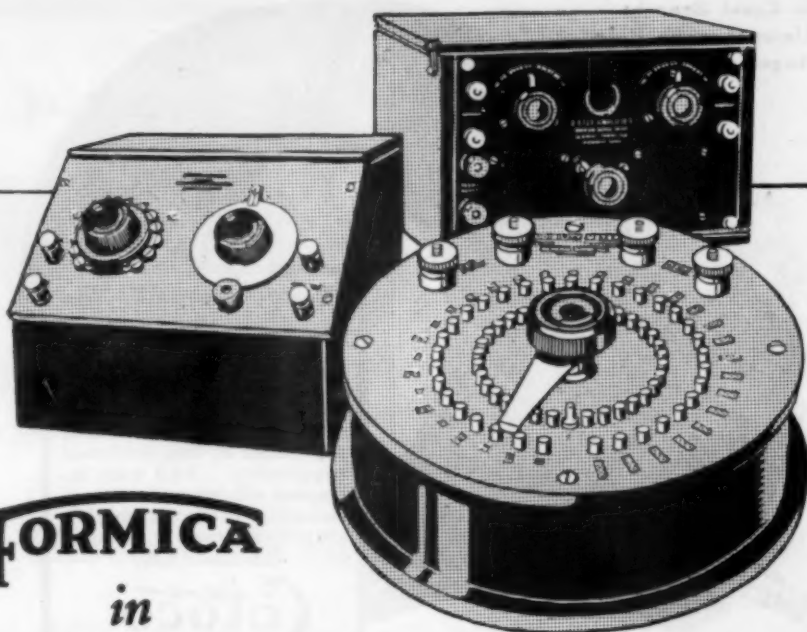
Just the thing for your home.

A silk-covered wire but 20 feet long, supplied with this Receiver, does the work of the unsightly outdoor antenna, or loop. This wire may be concealed behind the picture moulding or run along the baseboard.

Send for illustrated booklet "S"

This set can be seen at your dealer's

**Philadelphia Wireless
Sales Corporation
1533 Pine Street
Philadelphia**



FORMICA *in* **GENERAL RADIO Apparatus**

THE General Radio Company, makers of precision instruments for use in radio and electrical work is one of the oldest as well as the most consistent users of Formica.

The high quality of the General Radio product is assurance to amateurs and dealers everywhere that when they use Formica insulation, they are using the best material that the market affords.

Formica service is as good as the product. It supplies promptly a panel or tube of just the size that is wanted—no need to confine yourself to so-called standard sizes that some one else wants to sell.

THE FORMICA INSULATION COMPANY

4620 Spring Grove Avenue, Cincinnati, Ohio

Sales Offices

50 Church St., New York, N. Y.	1210 Arch St., Philadelphia, Pa.	414 Finance Bldg., Cleveland, Ohio
422 First Ave., Pittsburgh, Pa.	1819 Lyndale Ave., S. Minneapolis, Minn.	9 S. Clinton St., Chicago, Ill.
1042 Granite Bldg., Rochester, N. Y.	Sheldon Bldg., San Francisco, California	313 Title Bldg., Baltimore, Md.
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FORMICA

Made from Anhydrous Redmanol Resins
SHEETS TUBES RODS

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

Pacific Coast Branch:
329 Union League Bldg.,
Los Angeles.



The Superlative Inductance

Four years of careful attention to the details of manufacture of this type of inductance unit has yielded a product of unquestioned superiority. And with increased efficiency in manufacturing methods, moderate prices prevail for all sizes

Ask Your Dealer

Cotoco

"Built First to Last"

COTO-COIL CO. PROVIDENCE



MA-13

Of Special Interest to Radio Dealers!

One of Chicago's oldest and largest exclusive radio stores sold more Mu-Rad Receiving Sets in 1922-23 than all other types of Receivers combined!

Mu-Rad S-11s!

That fact has been repeatedly verified by our many other Mu-Rad dealers in the middle-west. Why not join them? Why not enjoy as they do the assured profits of good radio merchandise well advertised (see page 102 of this magazine)?

Write for Mu-Rad Franchise

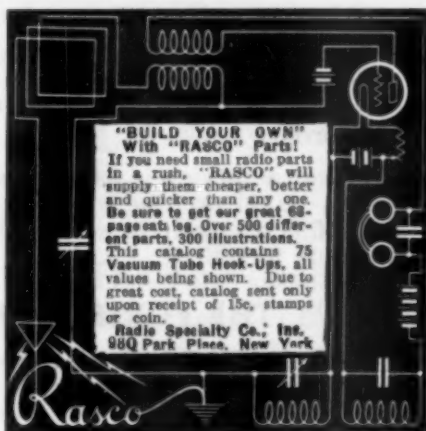
To get complete details of our special Mu-Rad proposition will not obligate you. Write also for a copy of our hand-book catalog of other profitable radio merchandise. Write today before someone else in your neighborhood gets exclusive Mu-Rad privileges.

Chicago Radio Apparatus Co.

—Jobbers of good Radio Merchandise—

General Offices: 407 S. Dearborn St.

— CHICAGO —



PURE ALUMINUM

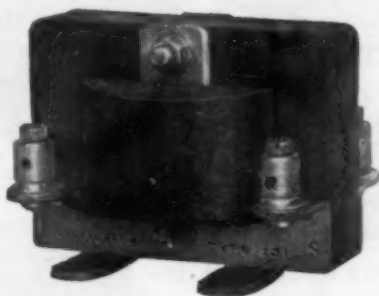
Pure sheet aluminum for rectifiers, $\frac{1}{16}$ inch thick, at \$1.50 per square foot.

Can also be used for panels on receiving sets.

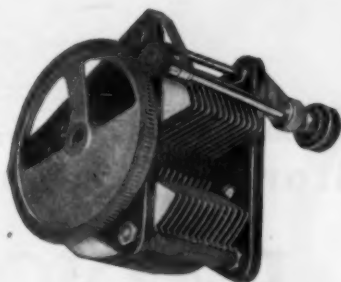
ELECTRICAL SPECIALTY CO.

407 Indiana Ave., 9DVK, Valparaiso, Ind.

If you're building a Set—



Type
231



Type 247

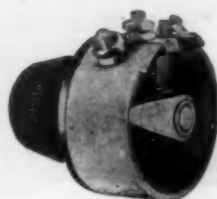
Here are the essentials!

1. A quality Condenser—type 247—fitted with reduction gearing for fine capacity adjustment:
2. A Rheostat (or Potentiometer)—type 301—designed especially for UV-199 and 201A tubes:
3. A UV-199 Tube Socket, ruggedly built of molded Bakelite, with phosphor bronze springs:
4. And the well known General Radio Co. Amplifying Transformer giving maximum amplification without distortion.

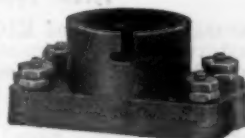
All of these are guaranteed by the General Radio Company.

For dependability and results build your set around these essentials.

Ask for Bulletin 914Q. It contains our complete line of receiving equipment.



Type 301



Type 299

PRICES:

Type 247	
Variable Geared Con-	
denser	\$3.25 to \$7.25
Type 301	
Rheostat	
10 or 30 Ohms	...\$1.25
Type 301	
Potentiometer	
200 Ohms\$1.25
Type 299	
Vacuum Tube	
Socket\$0.75
Type 231	
Amplifying	
Transformer\$5.00

General Radio Company

Manufacturers of Electrical and Radio Laboratory Apparatus

Massachusetts Avenue and Windsor Street

Cambridge,

Massachusetts

5569



Kimley "B" Battery Charger
Storage Batteries
designed for
RADIO



100 volt "B" Battery with Panel Control
(New Type)

Among the users of KICO Storage "B" Batteries are prominent engineers, the United States Government, many colleges and educational institutions and most of all, amateurs who understand radio, who have been sold thousands.

A FEW REASONS

1. Alkaline type will not sulphate nor buckle.
2. Not harmed by short-circuiting, overcharging, or standing idle.
3. Panel switches afford single cell variations (Critical adjustments are essential for phone reception.)
4. Easily recharged from any 110 volt A.C. line by means of a small home rectifier.
5. Using a 100 volt battery on a detector and two or three steps of audio amplification, one charge lasts from two to four months.
6. Neat and compact.
7. Unlimited life.
8. All batteries are sold with the privilege of receiving your money back if not satisfied within a 30-day trial.

Prices without rectifier

	Plain	(With Panels)
16 cell 22 volt.....	\$5.50	
24 cell 32 volt.....	7.25	\$11.75
36 cell 48 volt.....	9.50	14.00
50 cell 68 volt.....	12.50	17.00
78 cell 100 volt.....	17.50	22.50
106 cell 145 volt.....	23.50	28.50
Unmounted rectifier.....	1.00	
Mounted rectifier.....	2.50	

F. O. B. Buffalo, N. Y.

Literature gladly furnished.

KIMLEY ELECTRIC CO., Inc.
2665 Main St., Buffalo, N. Y.

RADIO TRANSFORMERS

REAL MERIT is what you expect and what you receive when you use STANDARD Radio Transformers.



Type M



Type FL



Type MR

PERFECTLY SHIELDED by virtue of the design MAXIMUM AMPLIFICATION by proper impedance.

Silicon steel cores, insulation test on coils 1500 volts. Bakelite Terminal Board.

Type M—Ratio 9 to 1.....\$5.00
Type MR—Ratio 4 to 1..... 4.50
Type FL—Filament Heating..... 9.00
Discount 10% for cash with order.

Designed by *Pittsburgh* engineers, a quality name in Radio.

THE
STANDARD TRANSFORMER COMPANY
WARREN, OHIO

PANEL SERVICE

We offer to the amateur and dealer

REAL PANEL SERVICE

Our panels are cut to your order. Only genuine Condensite and Formica used.

1/8" per square inch \$0.02

3/16" per square inch .02½

1/4" per square inch .03

We also carry a complete line of radio essentials. Dealers will find it profitable to have our latest price list and discount sheet.

PITTSBURGH RADIO

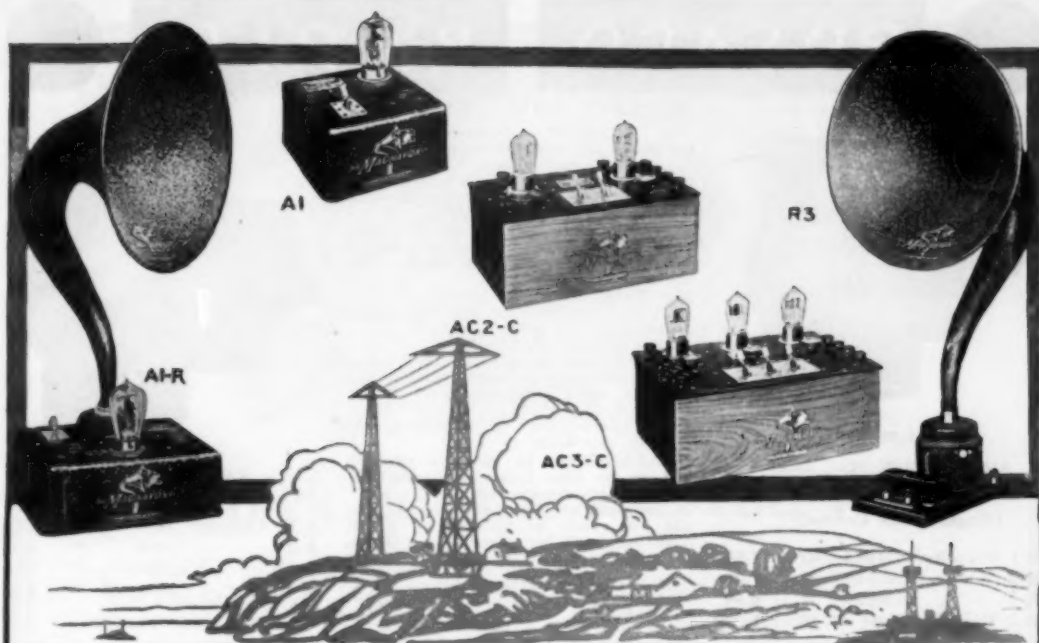
AND

APPLIANCE CO., Inc.

"Pittsburgh's Radio Shop"

Desk B

112 Diamond St., Pittsburgh, Pa.



Radio Takes Another Step Forward

THE new Magnavox models (rapidly being distributed to the trade) extend and supplement the already famous Magnavox line, which now includes a Magnavox for every receiving set.

A brief summary of Magnavox products is given below:

Magnavox Reproducers

- R-2 with 18-inch curvex horn. . . \$60.00
- R-3 with 14-inch curvex horn. . . 35.00
- M1 with 14-inch curvex horn; requires no battery for the field. . . 35.00

Magnavox Combination Sets

- A1-R consisting of Reproducer R3 and 1 stage of amplification. . . \$59.00
- A2-R consisting of Reproducer R3 and 2 stages of amplification. . . 85.00
- A1-M same as A1-R but with Reproducer M1 59.00

- A2-M same as A2-R but with Reproducer M1 85.00

Magnavox Power Amplifiers

- A1—new 1-stage Power Amplifier. \$27.50
- AC-2-C—2-stage Power Amplifier. 55.00
- AC-3-C—3-stage Power Amplifier. 75.00

Ask your dealer for demonstration. Interesting booklet will be sent on request.

THE MAGNAVOX COMPANY
Oakland, California
New York Office: 370 Seventh Avenue

MAGNAVOX PRODUCTS

The only complete line of Reproducers and Power Amplifiers

8-T

POSACO

RADIO



Patent applied for

ALDEN L. MCMURTRY, License

VERNIER

(Single Knob Control)

B-1 Capacity .001045 Mfd. \$7.50
 B-2 " .000545 " 7.00
 B-3 " .000295 " 6.50
 D-2 Highest Grade 4" Dial. 1.00

QUALITY AND EFFICIENCY

The "POSACO" condenser has made for itself an enviable reputation. It is a real instrument. The single knob controlled vernier is an absolute necessity for efficient tuning in radio frequency, super-regenerative and regenerative circuits. The regular variable is unexcelled for use in circuits which do not require a vernier adjustment.

MATERIALS used in the manufacture of these instruments are the finest obtainable.

WORKMANSHIP, the best. CONSTRUCTION and DESIGN, electrically and mechanically correct. Absolutely rigid. Minimum of dielectric loss.

Each instrument is tested before leaving our factory.

GUARANTEED to give satisfaction and to be free from any defect in materials or workmanship.

If your dealer or jobber cannot supply you, send us your order direct, together with his name and address.

Circular sent free upon request.

Manufactured by

THE C. D. POTTER CO.
 STAMFORD, CONN., U. S. A.



Patent applied for

REGULAR

	Capacity	Mfd.	\$4.50
A-1	.001		
A-2	" .0005	"	4.00
A-3	" .00025	"	3.50
A-4	" .000045	"	3.00

POSACO

RADIO

CLEARANCE SALE

Here are a few items that I am selling off at greatly reduced prices. Send for list of other bargains.

Type C Baldwin Fones.. \$10.00
 Type E Baldwin Fones.. 10.00
 Type F Baldwin Fones.. 12.00
 4000 ohm Brown Adjustable Fones..... 16.00
 Type E-2 3000 ohm Everett Fones..... 5.00
 Type 2-A 2000 ohm Stromberg-Carlson Fones.... 5.00
 2400 ohm Kellogg Fones. 5.00
 Type 1002-C 2200 ohm Western Electric Fones 8.00
 50-W 1100 ohm Federal Single Fones..... 4.00
 Federal Pleiophone Loud Speakers 5.00

THE RADIO STORE

562 East Colorado St.
 Pasadena, Calif.

WOC—TRESKO

Licensed Armstrong
 U. S. Patent
 No. 1118149



Two things that made Davenport famous. A complete 2000 mile Armstrong regenerative tuner for \$25.00. Use it with any make bulb W.D.11 or 12, or dry battery operation as well as storage battery. Portable set to use at camp or in your machine. Complete with bulb, batteries and phones, etc., \$37.50. Circulars free. This set received the Chicago American Regional Prize of \$350.00.

TRESKO

Tri City Radio Electric Supply Co.
 Box 148, Davenport, Iowa

Radio Operators! Radio Operators! Radio Operators!

The shortage of Radio operators increases! During the past month we have been unable to find enough men for shipboard positions. More ships are in operation to all parts of the world and more Radio Operators are needed every month.

Join our SPECIAL SUMMER COURSE in Radio and prepare for an assured future with good pay and attractive opportunities for advancement.

Classes forming every Monday. Special Short Summer Course. Full particulars for the asking.

EASTERN RADIO INSTITUTE

899 Boylston Street, Boston
 Tel. Back Bay 5964



Just pick out the size you want

CELORON Radio Panels, ready-cut in standard sizes, save you the trouble and delay of having your panel cut to order. Just go to a nearby radio dealer who sells Celoron panels and pick out the size you want. Then you are sure of getting a panel that is neatly trimmed and finished, and something more—you get the necessary insulation for successful receiving.

Condensite Celoron has high dielectric strength and great insulation resistance. Its moisture-repelling properties prevent warping.

Easy to work

You will like the "workability" of Celoron panels. They are easy to drill, tap, saw, and mill, and will engrave evenly without feathering. Each panel is wrapped in glassine paper to protect the surface. On

every one are complete instructions for working and finishing.

One of these standard sizes will fit the set you intend to build:

- | | |
|----------------------------|---------------------------|
| 1—6 x 7 x $\frac{1}{8}$ | 4—7 x 18 x $\frac{3}{16}$ |
| 2—7 x 9 x $\frac{1}{8}$ | 5—9 x 14 x $\frac{3}{16}$ |
| 3—7 x 12 x $\frac{1}{8}$ | 6—7 x 21 x $\frac{3}{16}$ |
| 7—12 x 14 x $\frac{3}{16}$ | |

If your dealer cannot supply you, ask him to order for you, or write direct to us. Indicate by number the size you want. Celoron is also furnished in full-sized sheets, and we can cut panels in any sizes desired.

Write for this free booklet

Our booklet, "Tuning in on a New World," contains lists of the leading broadcasting stations in the United States and Canada, an explanation of symbols used in radio diagrams, and several efficient radio hook-ups. It will be sent free, on request.

To radio dealers: Send for special dealer price list showing standard assortments

Diamond State Fibre Company

BRIDGEPORT

(near Philadelphia)

PENNSYLVANIA

Offices in Principal Cities

In Canada: Diamond State Fibre Company of Canada, Limited, 245 Carlaw Ave., Toronto

CONDENSITE
CELORON
STANDARD RADIO PANEL

KEEP TO THE RIGHT

Quality Apparatus

We stock all makes and types of complete Radio sets and parts

Acme Apparatus Co. Adams Morgan Co. Andrea, F. A. D. A. & P. Radio Supplies Co. Baldwin, Nathaniel Brach, L. S. Mfg. Co. Brandes, C. Inc. Bunnell, J. H. Clapp-Eastham Co. Corwin, A. H. & Co. Cutler-Hammer Mfg. Co. DeForest Radio T. & T. Co. Dictograph Products Corporation Dubilier Condenser Co. Eby Mfg. Co. Federal T. & T. Co.	Firth, John & Co. Freed-Eisemann Co. Frost, Herbert H. General Radio Co. Kennedy, Colin B. Murdock, Wm. J. Co. Radio Distributing Co. Radio Corp. of America Remler Mfg. Co. Riley-Klotz Mfg. Co. Sleeper Radio Co. Ward Leonard Elec. Co. Western Elec. Co. Westinghouse Elec. Mfg. Co. Weston Elec. Inst. Co. Wireless Press, Inc.
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Delivery same day order received

Pioneers in the Radio Field

Send 10¢ for Latest Catalog

ROSE RADIO AND ELECTRICAL SUPPLIES

129 Camp Street,

New Orleans, La.

Super Values

PHONES:

N. & K.	German, 6000 Ohms	\$5.50
Brandes	Superior, Matched Tone	\$5.25
Standard,	3000 Ohms	\$3.50

CONDENSERS

3	Plate Vernier	\$.90
23	" "	2.50
43	" "	2.75
23	" Plain	1.50
43	" Plain	1.75

Send us a list of your requirements, of Anything in Radio Apparatus and we will quote you Special Prices. Convince yourself that this is the Best Way to Save Money.

All Mail Orders Shipped Promptly. Send Money Order including Postage

Write for Our Catalogue A

HANES-ZENER CO.

The RADIO Mail Order-House

Known for Low Prices

3 West 29th St., N. Y. City



Super-Sensitiveness!

The crystal is the "bull's-eye" of your crystal receiving set. Unless it is supersensitive you are wasting time and entertainment and cannot "hit" the combination for best results. Insist upon the genuine original Arlington Tested "NAA" Detector minerals. They are carefully selected from bulk stock, individually tested and guaranteed super-sensitive. Galena, Goldite or Silicon, price for crystal, 25¢. Same mounted in brass cup, 40¢. Obtainable at your dealers or sent direct (post-paid) on receipt of price.

The Newman-Stern Co.

Newman-Stern Building,

Cleveland

40%

Discount to retailers. All standard lines of radio goods at this price. Inquiries given our prompt attention.

R. R. GARRICK

#91 Homestead Ave.,

Beechwood,

Upper Darby, Pa.

IMPORTANT ANNOUNCEMENT Next Month

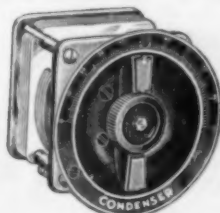
Rasla Sales Corporation

10 East 43rd St.,

New York City



The design of Head Phones is simple, practical and correct. May be worn for long periods without discomfort. Extraordinarily sensitive and reproduce sound with unusual clarity. Give complete satisfaction.



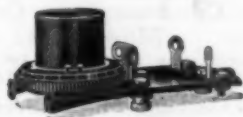
Hard-drawn aluminum plates and rugged construction throughout insure continuous functioning of Condenser. The vernier plate is controlled by the knob nested within control bar.



The Variocoupler is complete in every detail. No additional parts are required to complete the assembly. A tap-switch is carried *inside* the rotor and forms an integral part of the unit.



The finest grade insulating materials are used in the Variometer. Forms are exceptionally light in weight; the losses usually encountered through large masses of insulation being thereby reduced.



A combination Detector Unit, comprised of socket, rheostat and spring clips for holding grid leak and grid condenser. Socket terminals are connected to binding posts at rear.



The Amplifier Unit combines a socket, rheostat and audio frequency transformer—on a single mounting bracket. All leads are short and direct. Mounting is extremely simple.

Aluminum panels, in several stock sizes, are offered for use with Eisemann parts. The panels are completely drilled, and ready for use. No shielding is required; the metal panel itself acting as a perfect capacity shield.

Catalogue on request.

EISEMANN MAGNETO CORPORATION

William N. Shaw, President

BROOKLYN, N. Y.

DETROIT

CHICAGO

SAN FRANCISCO

FROST-FONES



Best for your set

because sensitive, finely made, low in price and high in quality. No other head fone at anywhere near Frost prices offers so much value for your money and gives such great satisfaction over years of use. Your dealer sells Frost-Fones. Order several pairs and a Frost-Jac-Box today, so that all the family can listen in.

HERBERT H. FROST, Inc.

154 West Lake Street, Chicago
30 Church Street, New York



3,250 HOUR'S SERVICE From A \$15.00 F-F BATTERY CHARGER

Dear Sir: Find enclosed fifty-four cents for which please send one set of carbon brushes for an F-F Battery Charger, Type 6. This charger has been in use on an average of 25 hours a week for about two and one-half years and the Carbons have never been renewed. The machine is giving very good service.

Yours very truly,
(Signed) Ralph C. Peters,
1810 Pine St., Boulder, Colo.

This unsolicited report is but one of thousands. It is the result of ten years specialization. You, too, can benefit just as Mr. Peters above, by insisting on the F-F Charger.

There's a type for every need. Buy from your dealer. If he cannot supply you, write for literature or enclose remittance covering express or postage charges on 9 lbs.

It's Free
Write for Bulletin No. 31
Dealers! Get the F-F Proposition



\$15.00

F.O.B. Cleveland

Type 6 charges 6 Volt Storage Battery from any 110 Volt 60 Cycle lamp socket at average rate of 6 amperes.

The France Mfg. Co.
10431 Berea Road,
Cleveland, Ohio

"EURACO" PRODUCTS

(Guaranteed)

Compact — Interchangeable
Most Efficient — Accurate:

60
Cents
per
Unit



60
Cents
per
Unit

Mica Condensers — Grid Leaks
Mountings:

Interesting Proposition for Dealers
EUROPEAN RADIO CO.

1342 East 22nd St., Brooklyn, N. Y.

WIS-WIN

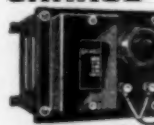
RADIO SWITCHES

Be up to date—Use our concealed types single hole mounting

Literature on request

WILLIS SWITCH & INSTRUMENT CO.
8 Kingsbury St. Jamestown, N. Y.

CHARGE YOUR BATTERY.



(RADIO OR AUTO)
at HOME for a NICKEL
The **HOMCHARGER**
POPULARLY PRICED — PAYS FOR ITSELF
SEND FOR THE AUTOMATIC ELECTRICAL
— DEVICES CO. —
FREE BOOK, 27 W. THIRD ST., CINCINNATI, OHIO



Type BX Voltmeter



Type PX-3 Ammeter



Watch Your Radio Set
Know what it is doing by
testing with
Westinghouse
Radio Testing Instruments

Westinghouse Ammeters
and Voltmeters are applic-
able to every condition
arising for tests on radio
apparatus and storage bat-
teries.

Folder 4471-B gives full particulars
Westinghouse Electric & Manufacturing Co.
Newark Works, Newark, N. J.

Westinghouse



Sterling Voltmeter

In the Interest of Better Radio Receiving

these
Sterling
DEVICES

STERLING VOLTMETERS

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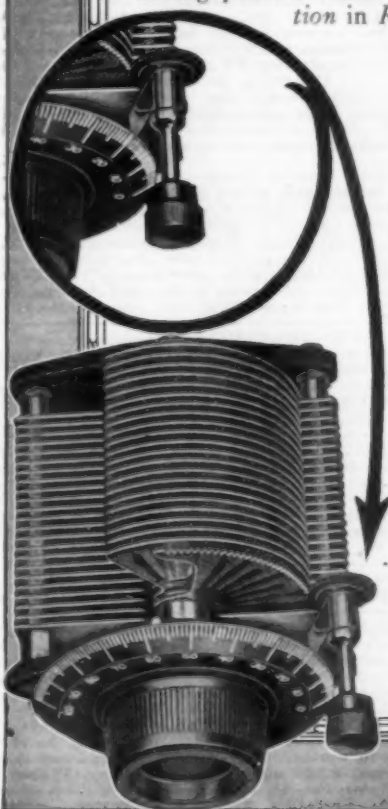
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FOR SALE: 20 watt transmitter & Phone less generator \$75; two Atlantic-Pacific receivers with tube \$50 each, slightly shop worn; 5 Radiotron detectors \$4 each; Four pair Brandes Supr. Phones \$5 each; One Hulberts Rectifier, \$15; One Marconi Coml. type OT \$5; and various other accessories. 1 Conn E Flat Baritone good as new in case, hundred dollars talks. Quitting the game. J. F. Avritch, P.O. Box 352, Stanley, No. Dak.

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\$2

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